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SUMMARY OF RECENT ABSTRACTS *

II. YELLOW FEVER †

Epidemiology: Transmission

In a symposium on yellow fever held in commemoration of Carlos Finlay (p. 389) several speakers combined to give a comprehensive survey of the different aspects of the disease, which should be read in full.

Panthier *et al.* (p. 267) investigated the neutralization test in mice with the Dakar strain of virus; there was no simple mathematical relationship between the results obtained with varying doses of virus and fixed doses of serum, and with some doses of virus a serum of low antibody titre could not be distinguished from a negative serum.

In reporting a small outbreak of yellow fever in Ghana, Boorman and Porterfield (p. 26) remark that their findings point to fairly intense transmission, and that though there was no proof of such a cycle, the hypothesis of an epizootic in monkeys with occasional transmission to man by *Aëdes africanus* is consistent with the observed facts. They mention the difficulty of clinical diagnosis when the disease is sporadic. Gillett (p. 1099) fed spiders and bugs from the Zika forest, Uganda, on mosquitoes infected with yellow fever virus, but the virus did not survive in these spiders and bugs, which therefore are unlikely to be reservoirs in nature.

No confirmed cases of yellow fever have hitherto been reported from Ethiopia or Eritrea, though immunity surveys have indicated the infection in certain parts. Chabaud and Ovazza (p. 1317) recently carried out a survey of 509 sera from 8 provinces, finding 7 positive to the mouse protection test, all from Assab, Eritrea. 3 were from adults and 4 from children (one aged about 2–4 years). 9 other sera were doubtful, possibly

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on yellow fever in this series see the February issues of the *Tropical Diseases Bulletin* each year since 1939.

as a result of antibodies to related viruses. A list is given of mosquitoes found which have elsewhere been shown capable of transmitting yellow fever; the *Aëdes* species were mostly exophilic in habit.

In 5 rural communities of Malaya Gordon Smith (p. 1099) found (in persons over 10 years old) neutralizing antibodies to Japanese encephalitis virus in 10–80%, to dengue in 74–90%, and to yellow fever in about one-third of the sera examined. The proportion of sera positive to yellow fever was related to the number of other B viruses to which neutralizing antibody was present, the yellow fever positives probably being due to cross reaction.

Boshell and Groot (p. 151) give a list of 1,271 primates tested for immunity to yellow fever in Nicaragua, Honduras and Guatemala in 1952–56, of which 76 were positive. They also give an account of the progress of the epizootic in those regions. The techniques used are described, and the authors point out that these may need reconsideration in view of the fact that evidence of related antigens has recently been found in the same regions, for instance the Ilheus virus. It is necessary to keep these facts in mind when interpreting the results of neutralizing tests.

In Colombia the incidence of yellow fever tends to rise in December and January, when the dry season begins; Gast Galvis (p. 496) shows that more than half the cases occur in the mountains near the Magdalena River and its tributaries. There has been no appreciable annual increase since 1947.

De Rodaniche (p. 267) reports mouse protection tests with the sera of primates in Panama in recent years. Squirrel marmosets (*Marikina*) and spider monkeys (*Ateles*) provided positive sera, some in high titre, and the results suggest continued virus activity since the outbreaks of 1948–51. *Aotus*, *Cebus* and *Alouatta* monkeys were negative.

Komp (p. 27) remarks that any species of *Haemagogus* which attacks man in numbers at ground level is suspect as a possible vector of yellow fever, particularly in an endemic area. He reports *H. boshelli* in large numbers in the eastern part of Panama where an epidemic of a disease resembling yellow fever occurred in 1952.

No human yellow fever had been found in eastern Panama after 1949 until one death occurred in 1956 [but see Komp, above]; De Rodaniche *et al.* (p. 880), however, who made mosquito collections in 1956, recovered virus from pools of *H. lucifer*, *H. equinus*, *H. spegazzinii falco*, *Anopheles neivai* and *Sabethes chloropterus*. They conclude from this and other evidence that *H. lucifer* is important in transmission in the eastern forested regions. Galindo *et al.* (p. 1217) remark that in Panama the critical period for the maintenance of yellow fever transmission is the dry season, January to April. The arboreal mosquitoes breed in tree holes which are affected by the variable rainfall which prevails, but *H. equinus* and *H. lucifer* lay eggs which resist desiccation, and *Sabethes chloropterus* lays in tree holes with small apertures. There seems to be

enough variation in the mosquito population in the dry season to enable some vectors to be present every month. GALINDO (p. 1218) describes how *Sabethes chloropterus*, while on the wing, ejects eggs from the tip of the abdomen into bamboo canes through holes measuring only one quarter of an inch, and made by boring insects. In this way the eggs reach water contained in the bamboo. He (p. 1217) recognizes the validity of the names *H. spegazzinii falco* and *H. s. spegazzinii*, but not *H. janthinomys*, which should be regarded on a synonym of *H. s. spegazzinii*.

The great wave of yellow fever entered Guatemala in October 1955, having survived a prolonged dry season. BOSHELL and BEVIER (p. 749) believe that it entered through a remnant strip of forest containing *Haemagogus equinus* and *Sabethes chloropterus*, and *Alouatta* monkeys. *Ateles* monkeys also existed in Guatemala, but at the end of the epizootic the primates seem to have been wiped out. Yellow fever virus was isolated from *H. equinus* and *H. mesodentatus* and from *S. chloropterus*; *H. mesodentatus* is believed to be the principal vector.

BEJARANO (pp. 1001, 1002) quotes findings which indicate that jungle yellow fever, transmitted by *Haemagogus* and non-domestic *Aëdes*, exists in Argentina, occasionally affecting man. Legislation has been enacted for the control of *Aëdes aegypti* and vaccination of people at risk. He discusses the various species of mosquitoes which may be important in this connexion in Argentina.

A general account of the taxonomy and bionomics of *Aëdes aegypti*, the subspecies *formosus* and the variety *queenslandensis* is given by MATTINGLY (p. 645), who also (p. 880) discusses its disease relationships, genetics and control. All 3 forms may be involved in transmission of yellow fever in various parts of Africa. The fact that the type form and ssp. *formosus* may both be domesticated, semi-wild or wild, means that eradication is difficult, but *queenslandensis* is wholly domestic.

SURTEES (p. 882) has observed that *Aëdes aegypti* can survive the dry season of Southern Nigeria as drought-resistant eggs. SMITH and LOVE (p. 1217) investigated the winter and spring survival of *Aëdes aegypti* in south-west Georgia, U.S.A.

Clinical findings: Pathology

In 1951–54 epidemics of yellow fever occurred in Eastern Nigeria, and MACNAMARA (p. 391) reports on the clinical and pathological observations made. In mild but confirmed cases there was no jaundice, enlargement of the liver or bradycardia, and albuminuria was slight. Serious cases (one-quarter of the whole) showed the classical picture, but in some prolonged cases the disease closely resembled infectious hepatitis. The quantity of circulating virus was highest in the first 2–3 days of illness. Little help was obtained from leucocyte counts. Diagnosis, except in the classical form, is difficult by purely clinical means.

BEARCROFT (p. 392) describes the histopathology of the liver in rhesus monkeys infected with yellow fever. There was evidence which suggested

that previous infection with the Zika virus modified the course of the yellow fever. Barbareschi (p. 496) describes alterations in the glomeruli of the kidneys in yellow fever.

Boiron and Camain (p. 1100) show that yellow fever virus persists for several days after inoculation into guineapigs, and provokes the formation of antibodies, but there are no symptoms and the infection is inapparent.

Vaccination: Mosquito Control

The Expert Committee of WHO on Yellow Fever Vaccine (p. 393) in its first report made various recommendations on potency and safety, which should be read in full. They comment on encephalitis after vaccination, which mostly occurs in children under one year old, and they point to the need for further research on this and other subjects relating to the vaccine.

Cannon *et al.* (p. 152) carried out extensive vaccination campaigns against yellow fever, using chick-embryo or mouse-brain vaccine administered by scarification. The general conversion rate as determined by examination of sample sera was 88%, and there were no untoward reactions. The authors therefore claim that scarification is the technique of choice.

Kerr (p. 268) suggests that in jungle yellow fever areas vaccination to produce immunity in 85% of the population is not enough since cases continue to occur; means should be found of increasing the rate which, in some apparently well vaccinated areas, may not exceed 80%. In Africa, however, where the urban vectors are likely to remain largely uncontrolled for some time, the authorities are concerned with the prevention of epidemics resulting from the introduction of the jungle virus into communities with low herd immunity; Meers (p. 882) therefore argues that vaccination, even to the level of only 85%, reduces the number at risk and prevents the initiation of urban epidemics.

Macdonald (p. 151) discusses experiments on the control of *Aëdes aegypti* in parts of Malaya by insecticidal spray and antilarval measures. Peridomestic spraying of insecticide in part of Trinidad was unsatisfactory against *Aëdes aegypti*, and Kellett and Omardeen (p. 27) therefore investigated the possibility that it was breeding in tree holes, and found this to be the case, though it has rarely been reported in other parts of the New World.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Pipkin, A. C. & Jensen, D. V. **Avian Embryos and Tissue Culture in the Study of Parasitic Protozoa. I. Malarial Parasites.** *Exper. Parasit.* New York. 1958, Sept., v. 7, No. 5, 491–530, 3 figs. [Numerous refs.]

Jeffery, G. M. **Infectivity to Mosquitoes of *Plasmodium vivax* following Treatment with Chloroquine and other Antimalarials.** *Amer. J. Trop. Med. & Hyg.* 1958, Mar., v. 7, No. 2, 207–11.

The effect of various drugs on the infectivity of gametocytes of the Chesson strain of *Plasmodium vivax* to *Anopheles quadrimaculatus* was tested in white patients. Chloroquine (1·5 gm.) was given to 20 patients (with 1 to 7 weeks' duration of parasitaemia), and 7 became non-infective in less than 24 hours, 8 after the first day and 1 after the second. The addition of primaquine in a single case was followed by loss of infectivity in the following 24 hours. Chlorguanide [proguanil] was given to 4 patients and infectivity to mosquitoes ceased within 24 hours of a dose as low as 50 mgm., though it returned later with this low—but not with higher—dosage of the drug. One patient was treated with 25 mgm. of pyrimethamine and became non-infective 4 hours later; a pyrimethamine-resistant strain of *P. vivax*, however, proved infective to mosquitoes even with daily administration of the drug and for 4 days after cessation of treatment. Sodium bismuth thioglycollate was inoculated into 25 patients and all except one proved non-infective to mosquitoes within a day, though infectivity returned in 3 days or less. *P. C. C. Garnham*

Coluzzi, M. Un metodo " standard " per ottenere facilmente ovodeposizioni. Trasporto e montaggio degli anofeli. [**A " Standard " Method for obtaining Egg Production in Mosquitoes. Transport and Mounting of Anophelines**] *Riv. di Malariologia.* 1958, June, v. 37, Nos. 1/3, 85–9, 4 figs.

Bhatia, M. L., Wattal, B. L., Mammen, M. L. & Kalra, N. L. **Seasonal Prevalence of Anophelines near Delhi.** *Indian J. Malariology.* 1958, Mar., v. 12, No. 1, 13–38, 9 graphs (1 folding) & 1 map. [12 refs.]

Studies are reported of routine standard collections of anopheline mosquitoes in three villages, 12–14 miles from Delhi, made between

February 1953 and July 1957. In this area most of the rains fall between June and October and there is a cold, dry period (mean monthly temperatures 59°–65°F.) between December and February, which is followed by a hot, dry period (83°–93°F.) between April and June.

10 species of *Anopheles*, *A. annularis*, *A. barbirostris*, *A. culicifacies*, *A. fluviatilis*, *A. hyrcanus*, *A. pallidus*, *A. pulcherrimus*, *A. splendidus*, *A. stephensi* and *A. subpictus*, are recorded, of which only *A. culicifacies* was known to be a vector of malaria in the area. *A. culicifacies* was found to have two seasonal peak populations, one in April–May and one in August–December, but adults were captured in every month of the period of investigation. The most important controlling factor for this species appears to be the formation of fresh rain water pools in July, August and September. *A. annularis* was the dominant species of *Anopheles* in the area and this mosquito was also present throughout the year. The seasonal distributions of the other species are given, and the adult resting places and sex ratio are also briefly discussed, but these details should be consulted in the original paper. *B. R. Laurence*

De Andrade, R. M. & Verano, O. T. Contribuição para o conhecimento da fauna de anofelinos do Estado de Goiás. Área de distribuição e incidência das espécies por sedes municipais e distritais, povoados e fazendas (Diptera, Culicidae). [**Anopheline Fauna of the State of Goiás, Brazil. Distribution and Incidence of Species in Municipalities, Districts, Villages and Plantations**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, July, v. 9, No. 3, 365–90, 12 graphs & 1 map. English summary (2 lines).

De Andrade, R. M. & Brandão, H. Contribuição para o conhecimento da fauna de anofelinos do Estado do Espírito Santo. Área de distribuição e incidência das espécies por cidades, vilas e povoados (Diptera, Culicidae). [**Anopheline Fauna of the State of Espírito Santo, Brazil. Distribution and Incidence of Species for Cities, Towns and Villages**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, July, v. 9, No. 3, 391–416, 7 maps & 10 graphs. English summary (2 lines).

De Andrade, R. M. Dados comparativos de pH em biótopos de anofelinos, pesquisados no Distrito Federal, Brasil. I. *Anopheles tarsimaculatus* e *Anopheles argyritarsis* (Diptera, Culicidae). [**Comparative Data on *p*H in Anopheline Biotypes in the Federal District, Brazil. I. *Anopheles tarsimaculatus* and *A. argyritarsis***. *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Apr., v. 9, No. 2, 217–24.

English summary. II. *Anopheles albitarsis* e *Anopheles noroestensis* (Diptera, Culicidae). **II.** *A. albitarsis* **and** *A. noroestensis*] *Ibid.*, July, No. 3, 333–6. English summary (9 lines).

The relationship of larval density to the *p*H of breeding waters, within a range of less than 3 to 8, is reported for four species of anopheline. *A. tarsimaculatus* was most abundant at the lowest *p*H figure and did not occur with alkaline values. *A. argyritarsis*, by contrast, occurred most in the *p*H range 7 to 8. *A. albitarsis* and *A. noroestensis* occurred more in waters on the acid side of neutrality, but did not show a marked gradient in larval numbers, like the first two species, related to *p*H values.

D. S. Bertram

Schneider, R. Die Serumproteinveränderungen bei der Malaria tertiana. [**Serum Protein Changes in Tertian Malaria**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 234–43, 11 figs. [17 refs.]

In the tropics malaria is usually associated with other infections and with malnutrition. Therefore changes in the serum protein such as a fall in albumin and a rise in gamma globulin may be due to a variety of causes, all of which may produce liver damage. When otherwise healthy patients with neurosyphilis in Erlangen, Germany, were treated with induced tertian malaria it was possible to study the effect of malaria on the serum protein without these additional complications. In 11 such patients there was a considerable fall in serum albumin which was only partially balanced by a rise in gamma globulin, so that there was an overall decrease in total serum protein. The changes in serum alpha globulins and beta globulins were less constant. The serum protein pattern returned to normal within 3 weeks after the conclusion of the malarial treatment. The author concludes that a short course of malaria causes no permanent liver damage.

H. Lehmann

Romiti, C. **Post-Operative Malaria.** *West Indian Med. J.* 1957, Dec., v. 6, No. 4, 272–84, 7 figs.

Between 1924 and 1947, before malaria control was properly instituted, 3,445 patients out of 15,919 subjected to operation had a history of malaria or clinical evidence of malaria at operation and of these 507 suffered post-operative malaria attacks. Between 1948 and 1955, during which period eradication of malaria was established, 10,748 patients were operated upon and there were only 5 cases of post-operative malaria.

A review of the earlier series of patients showed that *P. vivax* was much the commonest malaria parasite responsible for the post-operative malaria attacks. About 12% were due to *P. malariae*. Attacks were most often seen in patients who presented for operation with enlarged

spleens or parasites in the blood, or both. The type of operation had no effect on the appearance of the post-operative malaria attack. The incidence was, however, highest with spinal and local anaesthesia, lowest with ether.

The author suggests that certain of the anaesthetics and possibly the stress of operation induced splenic contraction with release of malaria parasites in the blood stream. *B. G. Maegraith*

GREWAL, R. S. **The Rôle of Quinine in Haemolysis.** *Brit. J. Pharmacol. & Chemotherapy.* 1958, June, v. 13, No. 2, 175–7. [13 refs.]

The haemolytic activity of quinine dihydrochloride for rabbit and human erythrocytes was examined *in vitro*. The former were lysed in concentrations of up to 1 in 600, the latter up to 1 in 700.

In a concentration of 1 in 10,000 quinine increased the haemolysing effect of saponin, bile salts and digitonin on rabbit erythrocytes and of the bile salts on human erythrocytes.

Quinine dihydrochloride 35 mgm. per kgm. was injected intravenously into a rabbit. The haemolysing effect induced by a standard concentration of saponin on erythrocytes taken after the injection was greater than on erythrocytes taken from the same animal immediately before. It was noted that the speed of haemolysis caused by saponin was greater on cells taken after the injection.

The author concludes that quinine may increase haemolysis by rendering the erythrocytes more susceptible to the action of tissue lytic factors [MAEGRAITH *et al.*, this *Bulletin*, 1943, v. 40, 584]. *B. G. Maegraith*

BRUCE-CHWATT, L. J. & HORN, D. W. **Antimalarial Drugs in Nigeria: Results of a New Survey.** *Brit. Med. J.* 1958, Oct. 11, 869–76. [26 refs.]

Previous surveys relating to the use of antimalarial drugs in Nigeria were made by L. J. and J. M. BRUCE-CHWATT in 1949 and by B. M. NICOL in 1951–52 [this *Bulletin*, 1950, v. 47, 956; 1953, v. 50, 1006]. The data now presented were obtained in response to questionnaires circulated in 1956 in order to bring this information up to date. Replies were received from 146 medical officers and from 1,026 householders resident in Lagos. These furnished data relating to 49% of the total population of expatriates residing in Nigeria.

The malaria morbidity of this population, which was estimated in 1950 at 225 per 1,000, was found to have decreased by 1956 to 142. Among 18,000 expatriates, only one death was attributed to malaria and one to blackwater fever.

The use of chloroquine for treatment of the malarial attack has progressively increased in recent years, and it is now generally regarded as

the drug of choice for this purpose. Mepacrine is second in popularity and amodiaquine third. For the emergency treatment of severe malaria mepacrine and chloroquine are used with equal frequency, mainly by intramuscular injection; quinine is also used, though somewhat less often, by the intramuscular and occasionally by the intravenous route.

For prophylaxis proguanil continues to be by far the most widely used drug, with pyrimethamine second and chloroquine third. Quinine and mepacrine are now rarely used for this purpose. In about 6% of those taking one or other of the protective drugs " break-throughs " have been reported, but evidence is lacking as to the reasons for such occurrences.

A number of serious and sometimes fatal sequelae of intramuscular mepacrine injections in infants and young children have been reported, but side-effects due to the use of protective drugs are rarely encountered.

No evidence is forthcoming as to any strain of malaria plasmodium in Nigeria having become resistant to therapeutic doses of chloroquine, mepacrine or amodiaquine. Reports have been received from some quarters of increased tolerance by malarial parasites to proguanil or pyrimethamine given as suppressives, but these are described as " indirect and inconclusive ".

A table is given showing the amounts of antimalarial drugs in tablet form purchased by the Government Medical Departments in Nigeria annually during the period 1952–1957. The estimated cost of all antimalarial drugs used in 1956 for both prevention and treatment of malaria was approximately £60,000.

[It is impossible to do full justice to this very comprehensive and carefully documented survey in a brief abstract such as that given above.] *G. Covell*

Wilson, T. & Edeson, J. F. B. **Studies on the Chemotherapy of Malaria. VII. The Treatment of Acute Malaria in Malaya.** *Med. J. Malaya.* 1958, Mar., v. 12, No. 3, 471–99, 7 figs. [23 refs.]

This extremely interesting and important paper summarizes experiences in treating over 3,600 Asian patients in the last 10 years.

Chloroquine proved the most useful general-purpose antimalarial. Amodiaquine, mepacrine and quinine were the only other effective drugs of those tried.

Details of drug therapy and general treatment are given. In considering the treatment of gravely ill patients, the authors stress the priority of anti-shock measures and state their view that " the first consideration must be to keep them alive long enough for the antimalarial drug to act, and any measure which can assist towards this end should be employed ". Such measures include salt and water replacement, also, presumably, transfusion and the treatment of shock.

In the last respect they are in complete agreement with the abstracter that intravenous administration of noradrenaline (which is so successful

in the treatment of shock in *P. knowlesi* infections) should be tried in shocked *P. falciparum* cases, in order to provide valuable time for adjustment of the blood volume, for blood transfusion, and for the antimalarial drug to do its work (MAEGRAITH *et al.*, *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1956, v. 50, 311).

[There is so much information, common sense and good judgment to be found in this paper that an abstract is quite inadequate. It must be read in full.] *B. G. Maegraith*

COATNEY, G. R., MICKELSEN, O., BURGESS, R. W., YOUNG, M. D. & PIRKLE, C. I. **Chloroquine or Pyrimethamine in Salt as a Suppressive against Sporozoite-Induced *vivax* Malaria (Chesson Strain).** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 1, 53–67. [11 refs.]

Antimalarial drugs might be useful in some circumstances to assist or replace entomological methods of control of transmission. Such drugs must be cheap, non-toxic, and easy to put into general use. Combinations of antimalarials with table salt could meet such requirements. The authors present details of controlled experiments in which mixtures of chloroquine-salt and of pyrimethamine-salt were made available to volunteer inmates of a U.S. Prison who were exposed to sporozoite-induced *P. vivax* malaria (Chesson strain).

The procedures for preparing the salt mixtures are described. The mixtures were stable and acceptable to the volunteers (8 persons for each drug mixture), being indistinguishable from ordinary table salt. The mixtures were adjusted so that average consumption of " salt " provided the usual weekly dosage of the respective drugs. Complete suppression of malaria was achieved by this means. All control volunteers (5 in the chloroquine series: 4 in the pyrimethamine) not taking the mixtures, showed parasitaemia.

The intake of antimalarial drug could be checked roughly by estimation of urinary chloride output.

[See also PINOTTI *et al.*, this *Bulletin*, 1955, v. 52, 10; 1956, v. 53, 853 *bis*.] *B. G. Maegraith*

BUONOMINI, G. & COLUZZI, A. Efficacia e limiti della lotta antianofelica. Considerazioni sulle possibilità di eradicare le specie vettrici e sul problema della malaria in Italia. [**Efficacy and Limitations of Anopheline Control Measures. Observations on the Possibility of Eradicating Vector Species and the Malaria Problem in Italy**] *Riv. di Malariologia.* 1958, June, v. 37, Nos. 1/3, 1–20, 1 map. [14 refs.] English summary.

In reviewing the recent history of malaria control in Italy, the authors discuss the particular circumstances in different parts of the country

which have led to the present satisfactory position. In Elba, for example, the war finally produced a malaria epidemic, owing to neglect of drainage and to entry of gametocyte carriers among foreign soldiers. On the whole, however, the malaria vector (*Anopheles m. labranchiae*) was not under ideal conditions and improvement of drainage (in *bonifica*) combined with use of DDT larvicide finally eradicated it (its place being taken by less dangerous mosquitoes). Rather similar happenings occurred in the Frosinone province, where a severe epidemic raged in 1946. This was rapidly stopped by DDT house-spraying and by drug administration. Here, again, *A. m. labranchiae* was locally eradicated, by DDT treatment of its winter hibernation quarters. However, taking the country as a whole, it can be said that vector eradication by residual insecticides alone is not probable. Nevertheless, DDT house-spraying certainly keeps the mosquitoes outside the houses and this has contributed to malaria reduction.

Figures of case records for Italy from 1952 to 1957 show that malaria is now reduced to a very low level; but it has not vanished altogether. A careful investigation of some recent small outbreaks shows that they have been among people sleeping out-of-doors (or in temporary shelters) in the summer months, sometimes in the proximity of shepherds who are still taking quinine. The fact that cases are still rare is probably due to the small numbers of gametocyte carriers, and the authors suggest that attention to these would be more effective than continued anti-anopheline measures. However, a vigilant watch on both malaria and mosquito prevalence should be maintained. *J. R. Busvine*

Belios, G. D. [**Malaria Eradication Programme in Greece in 1957 and Proposed Programme for 1958**] *Arch. Hyg.* Athens. 1958, v. 8, Nos. 1/3, 22–55, 2 folding charts. [In Greek.] English summary 151–3.

It is reported in the English summary that during 1957 the Division of Malaria and Tropical Diseases was reorganized, being provided with 3 additional experimental malaria stations, 9 new field parasitological laboratories and 50 additional malaria inspectors. Other measures included provision for the active cooperation of a thousand rural dispensaries. The considerably enhanced programme of work included widespread radical treatment for *Plasmodium vivax* infections, additional epidemiological and entomological surveillance procedures, together with repetition of insecticidal spraying and its reinforcement in places by larvicides, and even by more conservative efforts to control breeding. The position at the end of the year was that malaria had been practically eradicated from Crete and the greater part of Epirus; most of the remaining endemicity was in 9 foci in north and west Greece; *P. falciparum* malaria appeared to be extinct and the numbers of *vivax* and

malariae infections were very small. It is considered that in some places the reaction of *Anopheles sacharovi* to insecticides should be described as tolerance rather than true resistance and even, in a few places, as susceptibility. The rest of the paper is devoted to an analysis of the programme for 1958 when it is intended to elaborate the active search for remaining cases by the use of paid and voluntary agents together with a minor use of insecticidal treatment in a limited number of villages.

G. Macdonald

Coluzzi, M. & Ruggiero, C. Indagine sulla sensibilità al DDT di alcune specie di anofeli della Somalia. [**Studies on the Susceptibility to DDT of Various Species of Anophelines from Somalia**] *Riv. di Malariologia.* 1958, June, v. 37, Nos. 1/3, 77–83. [10 refs.] English summary.

In Somalia, DDT house spraying as an antimalarial prophylactic was begun in 1956 and spraying is now carried out twice a year, with a mixture of DDT and BHC. Measurements of susceptibility levels of anophelines in various places were made by the Busvine test (modified by using only one mosquito per tube). Fairly extensive tests were made with *Anopheles gambiae* and *A. funestus* and limited tests with *A. coustani* and *A. pharoensis*. No significant difference was found between *A. gambiae* from treated and untreated areas; both were more susceptible than a laboratory colony in Rome, probably because of the better rearing conditions of the latter. Thus, there is no evidence of development of resistance.

The vector mosquitoes are still common in many breeding sites though they are not found in houses. The authors suggest this may be incipient behaviouristic resistance. [But, surely, it is a normal avoidance of DDT.]

J. R. Busvine

Floch, H. La lutte antipaludique en Guyane Française, organisée par la Direction Départmentale de la Santé. La neuvième campagne de dédétisation en Guyane Française. [**Malaria Control in French Guiana. Ninth Campaign of Spraying with DDT**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 430.* 1957, Aug., 69 pp., 2 charts. [34 refs.]

This 9th campaign was conducted in 1956. The author complains of some fiscal delays which hindered it, as they did the previous campaign; however, a great deal of spraying activity was evidently done, as shown by detailed figures. Nearly 2 million sq. metres of wall surface were treated in 12,000 houses in French Guiana and Cayenne; about 23%

by DDT suspension, 64% by DDT in kerosene and 13% by BHC suspension.

Malaria morbidity remained low, though the figures for 1956 (as for 1955) were slightly higher than the very low records for 1952–53. It seems not unlikely that practically all the cases of true malaria are relapses. This is consistent with the disappearance of *Plasmodium falciparum*, formerly the dominant parasite, and the absence of parasites in the young children examined.

Fears that good malaria control would result in total loss of premunition, with some dangerously severe cases, have not been justified. Such autochthonous cases as occurred since 1954 have not been unduly serious, and it seems probable that partial immunity lasts longer than was anticipated. Nevertheless, the low level of malaria incidence makes it desirable to guard against infections due to immigrants carrying gametocytes. A quarantine watch is being maintained and all immigrants from malarious areas are given suppressive treatment; this combines a schizonticide (4-aminoquinoline) and a gametocide (8-aminoquinoline) [this *Bulletin*, 1957, v. 54, 130].

The vital statistics for French Guiana and Cayenne continue to show the big favourable change reflecting the suppression of malaria since 1949–1950.

In making future plans, the author considers the risks of DDT-resistance developing in *Anopheles darlingi*. He does not consider this a serious threat, at present, and for the 10th campaign a double spraying of the coastal zone is planned, together with a single treatment in the interior.

Regarding other insects of medical importance, the following points are noted. *Aëdes aegypti* has not reappeared and seems to be really eradicated. *Culex fatigans* causes some concern; it is the vector of filariasis (*Wuchereria bancrofti*) and probably of St. Louis encephalitis virus in Guiana; and it is difficult to control. *Musca domestica* has developed partial resistance to residual insecticides. However, it is still possible to control it by (i) elimination of breeding sites (or their treatment with BHC, DDT or Diazinon), (ii) by poison baits of Diazinon or malathion, (iii) by screens, (iv) by hanging threads impregnated with Diazinon. Bed bugs are now DDT-resistant throughout Cayenne, but still susceptible to BHC.

[For 8th campaign, see this *Bulletin*, 1957, v. 54, 1055.]

J. R. Busvine

Rachou, R. G., Ferreira, M. O., Moura Lima, M., Ferreira Neto, J. A. & Martins, C. M. Primeiras provas de determinação da susceptibilidade de anofelinos brasileiros aos inseticidas. I. *Anopheles* (*Kerteszia*) *cruzii cruzii*, em São Miguel e Massiambu Pequeno (Estado de Santa Catarina). [**First Tests of Susceptibility of**

Brazilian Mosquitoes to Insecticides. I. *Anopheles cruzi* **in São Miguel and Massiambu Pequeno, Santa Catarina**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, July, v. 9, No. 3, 343–50, 2 graphs. English summary.

Rachou, R. G., Moura Lima, M., Paulini, E. & Memória, J. M. P. *II. Anopheles* (*Nyssorhynchus*) *darlingi*, em Engenheiro Dolabela (Estado de Minas Gerais). [**II.** *A. darlingi* **in Engenheiro Dolabela, Minas Gerais**] *Ibid.*, 351–9, 2 graphs. English summary.

I. Tests in early 1957 of the susceptibility of *Anopheles cruzii cruzii* [*A. cruzi*] to DDT, based on the standard WHO method, gave LD50 values of 0·5% for mosquitoes taken at human bait in a town in Brazil subject to DDT-residual sprayings since 1949; also for this species, taken at human bait, in a forest a kilometre from the nearest DDT-treated houses. It is concluded that resistance to DDT has not developed in this species during 8 years' use of DDT in the township.

II. With the same technique as above, the level of susceptibility to DDT of *A. darlingi* was found to be 0·38% ± 0·02 for mosquitoes taken at animal (horse) bait and 0·7% ± 0·03 for those taken at human bait. The tests were on mosquitoes taken in early 1957 at a town in the state of Minas Gerais, Brazil, treated with DDT residual spray indoors once to three times a year since 1946. In this locality malaria control, despite the treatments, was not satisfactory. It is suggested that the mosquitoes taken on human bait may be of an anthropophilic strain, showing some tolerance to DDT after about 10 years' exposure to the insecticide in houses, while those caught on the horse may be a zoophilic and mainly exophilic strain which has had less contact with the treated indoor surfaces over the years. It is, however, noted that the differences in susceptibility obtained in the tests may indicate only differences in the nature of the blood meals rather than true physiological differences in susceptibility. It seems very significant to this issue that mosquitoes taken on the human bait were more fully engorged than those taken from the horse. Further work is in progress. *D. S. Bertram*

See also p. 134, Werner & Kunert, Über die Ursache von congenitalen Protozoen-Infektionen. [**The Cause of Congenital Protozoal Infections**]

Ray, A. P.; Sharma, G. K. **Experimental Studies on Liver Injury in Malaria. Part I. Pathogenesis** [Ray]. *Indian J. Med. Res.* 1958, May, v. 46, No. 3, 359–67, 3 figs. on pl. [27 refs.] **Part II. Pathogenesis** [Ray & Sharma]. *Ibid.*, 367–76, 9 figs. on 3 pls. [29 refs.]

I. No histological changes (other than extensive phagocytosis of pigment by the Kupffer cells) were observed in the livers of 2 rhesus

monkeys and 2 anaemic monkeys (haemoglobin about 5·0 gm.%) at either 3 or 5 days after injection of blood containing killed *Plasmodium knowlesi* into the dorsal veins of the leg or into the mesenteric veins (2 animals). Plasma from normal monkeys also had no effect on the liver pattern. On the other hand, fatty parenchymal changes developed in 12 to 24 hours in normal and anaemic animals injected with plasma from heavily infected donors. The fatty lesions were concentrated mainly in the periportal regions. Biopsies taken on 4 to 7 days after the last inoculation showed some granularity and swelling of the parenchymal cells but practically no fat. When choline was administered with the plasma, the fatty changes did not appear or were minimal.

These experiments indicate that killed parasites have little effect on liver cells, whereas plasma from a heavily infected donor may initiate some form of fatty degeneration of the parenchymal cells, which can be prevented by the presence of excess choline.

The plasma of the infected animals may possibly contain " a certain factor or factors which were responsible for the development of fatty changes in the liver ".

II. Rhesus monkeys were subjected to sympathectomy before being infected with *Plasmodium knowlesi* (Nuri strain).

The sympathetic chain was removed in 12 monkeys at varying levels from the sixth to twelfth thoracic ganglia. One had unilateral sympathectomy (sixth to eighth segments), 7 bilateral. 2 had bilateral removal of eighth to tenth segments, 2 tenth to twelfth.

Liver tissues were removed for examination in the terminal stage of infection just before death.

The degree of parasitaemia reached was similar for all animals, including controls and was at " a level at which normally necrosis of the cells round the central hepatic vein is invariably present ".

Liver changes of the usual type were seen in controls.

In the animals with unilateral sympathectomy, necrosis of parenchymal cells was centrilobular in distribution and confined to a few lobules.

In the animals in which bilateral sympathectomy (sixth to tenth segments) had been performed " necrotic changes were conspicuous by their absence ". Many cells were swollen and showed fatty changes. In the animals in which the sympathectomy had been done at the tenth to twelfth segments necrotic changes were also absent but cellular swelling was more obvious especially near the central veins. Fatty changes were marked near the portal tracts.

The central hepatic veins were mostly normal in appearance.

Resection of the sympathetic fibres to the liver thus appeared to prevent centrilobular necrosis of the liver parenchyma. Ray (1954) [this *Bulletin*, 1955, v. 52, 338] previously showed that necrosis could be prevented by transfusion of whole blood or washed erythrocytes from normal monkeys.

In their discussion on the possible explanation of these results, the authors conclude that a "sphincter" mechanism in the hepatic venous tree (such as suggested by MAEGRAITH *et al.*, [*ibid.*, 1950, v. 47, 197]) was operative, arising from some stimulus transmitted through the sympathetic chain. Work is continuing on this line. *B. G. Maegraith*

FERNÁNDEZ NAFRIA, A. El paludismo experimental por *Plasmodium berghei*. [**Experimental** *Plasmodium berghei* **Malaria**] *Med. Trop.* Madrid. 1957, Apr. 1, v. 29, No. 4, 336–62; Sept., Oct. & Nov., v. 30, Nos. 3, 4 & 5, 171–92, 263–79 & 340–52, 7 graphs & 17 figs. 1958, Jan. & Feb., v. 31, Nos. 1 & 2, 16–32 & 121–34. [Numerous refs.]

In this series of papers, covering about 80 pages, the author gives a detailed account of his observations and experiments on *Plasmodium berghei* in laboratory rats and mice. Of all the rodents, the mouse appears to be the most susceptible host, the infection in most cases running an acute course terminating in death 6–10 days after inoculation, whereas in the rat the infection is much milder and usually ends in recovery, while in some cases this animal is refractory to infection. The progress of parasitaemia depends upon the route of inoculation, rising most rapidly after intracerebral and intraperitoneal inoculation, and least of all after intramuscular inoculation. All attempts to demonstrate the presence of exo-erythrocytic forms in the tissues have failed. It was found that the resistance to the infection increased with the age of the host, but it could be broken by splenectomy, as the result of which previously refractory animals could be easily infected. The parasites show a predilection for immature red cells, in which multiple infections are commonly encountered. The author describes the various stages of development in the blood, including gametocytes, the production of which persists throughout numerous direct passages of the parasite. The author found no evidence that a milk diet had any inhibitory effect on the course of the infection.

Among the blood changes produced by the infection importance is attached to a pernicious form of anaemia. The host responds by overproduction of immature red cells (reticulocytes and polychromatophils), which is regarded as a defence reaction. There is also marked leucocytosis, with an increase in the number of neutrophils. Autopsy of infected animals revealed a considerable enlargement of the spleen and liver, with abundant pigment derived from destroyed red cells.

Although the infection in mice is generally fatal, occasionally some animals are resistant to infection, indicating the existence in some animals of natural immunity. However, this resistance can be broken by splenectomy. On the other hand, the resistance acquired by rats following the primary attack is regarded as premunition. The author

was unsuccessful in his attempt to produce active immunization against *P. berghei* in these rodents.

Although most of the antimalarial drugs used—especially chloroquine—caused the disappearance of the parasites from the circulation, they were unable to prevent relapses. *C. A. Hoare*

Carrescia, P. M. & Arcoleo, G. Ulteriori ricerche con ceppi virulenti di *Plasmodium berghei* nei topi albini. [**Recent Researches on Virulent Strains of** *Plasmodium berghei* **in Mice**] *Riv. di Malariologia.* 1958, June, v. 37, Nos. 1/3, 57–68. English summary.

The investigation described in this paper was carried out with a strain of *Plasmodium berghei* whose virulence was increased by rapid passages through mice. It was maintained for a year by subinoculation of mice every 3–8 days, and observations were made on the duration of the infection, the degree of parasitaemia and the blood picture. The virulence of the strain was assessed by the proportion of infected normocytes. When blood was examined on the sixth day of infection there was a higher percentage of infected normocytes, but in blood taken after the parasitic crisis, macrocytic infections were more numerous. In normocytic infections parasitaemia was lower and the peak of mortality was reached on the sixth or seventh day. In general the number of normocytic and macrocytic infections remained constant and there was no increase of virulence. In order to raise the number of infected macrocytes, mice were inoculated with blood taken at the end of the infective period from the 34th passage animal. Out of the 49 inoculated mice, 30 (61·22%) had macrocytic and 19 (38·77%) normocytic infections. In subsequent passages there was an increase in the number of infections with a prolonged course.

It was demonstrated that frequent passages increased the virulence of *P. berghei*, as manifested by the rise in the proportion of infected normocytes, whereas in delayed passages there was a higher percentage of macrocytic infections. It is concluded that, in addition to genetic factors, the course of the infection with *P. berghei* is affected by the virulence of the strain. *C. A. Hoare*

Sergent, E. Sur la cuticule des hématies immatures de rongeurs et sur leur parasitisme par *Plasmodium berghei*. [**The Membrane of Immature Red Cells in Rodents and their Parasitization by** *Plasmodium berghei*] *Arch. Inst. Pasteur d'Algérie.* 1958, Mar., v. 36, No. 1, 1–5. [13 refs.]

During the first 24 hours after inoculation of *Plasmodium berghei*, the peripheral blood of infected mice is invaded by immature red blood corpuscles of two types: polychromatophils and reticulocytes, the

numbers of which may reach 170 and 180 thousand per cmm. respectively. Their rapid mobilization is due to the destruction of mature erythrocytes, whose numbers fall from 11½ million to 9½ million on the first day and to 6 million on the second day after inoculation. The polychromatophil cells differ from mature erythrocytes in having a soft cytoplasm and in being invested in a fragile membrane. It is suggested that these properties of the host cells facilitate penetration by the parasites. On the other hand, these cells do not seem to provide a favourable medium for their development, since many of the parasites undergo degenerative changes and disintegrate [this *Bulletin*, 1957, v. 54, 12]. *C. A. Hoare*

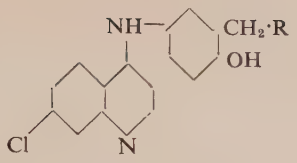
Fabiani, G., Orfila, J. & Prades, C. M. Les variations des plaquettes sanguines au cours du paludisme expérimental de la souris blanche. [**Variation in Blood Platelet Counts during Experimental Malaria in the Mouse**] *C.R. Soc. Biol.* 1958, v. 152, No. 4, 588–9.

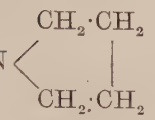
The occurrence of shock in mice infected with *Plasmodium berghei* on the 5th to 7th day of illness, and which proves rapidly fatal, has already been commented on by the authors [this *Bulletin*, 1956, v. 53, 547]. It does not appear to occur in mice infected with *P. vinckei* or in splenectomized animals. The clinical signs observed and their accentuation by acetylcholine and abolition by atropine suggested a cholinergic action. The factors affecting cholinesterase activity in the blood were therefore studied, particular attention being paid to variation in numbers of blood platelets in which this enzyme occurs. Platelet counts were made regularly and cholinesterase activity of whole blood determined with 2 different substrates. In all, 63 infected mice and 40 controls were used. Those animals which died of shock had very low platelet counts accompanied by low cholinesterase activity. The authors were led to the conclusion that the shock is caused by these factors. The absence of the condition of shock in animals previously splenectomized or infected with the closely related parasite, *P. vinckei*, was confirmed. *J. D. Fulton*

See also p. 136, Goble *et al.*, **Effects of Certain Antiorgan Sera on Experimental Malaria and Trypanosomiasis in Mice.**

Thompson, P. E., Weston, K., Glazko, A. J., Fisken, R. A., Reutner, T. F., Bayles, A. & Weston, J. K. **Laboratory Studies on Amopyroquin (Propoquin), an Antimalarial Compound.** *Antibiotics & Chemotherapy.* New York. 1958, Sept., v. 8, No. 9, 450–60. [21 refs.]

The drug named in the title has the following constitution,



in which R =  and is therefore closely related to amodiaquine in which R = $N(C_2H_5)_2$.

An investigation has been made of the toxicity of this substance in laboratory animals including rats, mice, dogs and rhesus monkeys. The antimalarial activity of the substance against *Plasmodium lophurae* in chicks was also tested by the methods previously described [this *Bulletin*, 1953, v. 50, 603]. The distribution of drug in tissues was determined by the fluorescent technique described earlier by Brodie *et al.* [*ibid.*, 1947, v. 44, 793]. Rodents were given the drug by canula or in diet. In other cases gelatin capsules were administered or injections by different routes were given. An extensive study was made of tissue pathology including detailed examinations of blood and urine.

It was found that the drug suppressed malarial infection in dosage ranging from 2·1 to 80 mgm./kgm. body weight per day. Its quinine equivalent was 37 and in potency it is very close to amodiaquine. Information was obtained on distribution in tissues, rate of absorption, excretion and breakdown. Absorption was rapid after oral dosage and the highest concentrations were found in liver, spleen, kidney and lung and was very low in plasma. Excretion and degradation occurred slowly but no investigation was made of the breakdown products. The LD50 values are given for acute and chronic oral toxicity and in acute intravenous toxicity. Injury of varying degree resulted from intramuscular injection. In chronic tests damage to the intestinal villi of rats occurred and the macrophages in that region appeared to contain much drug, as well as those in other sites. In rats and dogs, however, there was no evidence of drug cytotoxic effects. *J. D. Fulton*

Bauer, F. & Hohorst, W. *Hepatocystis kochi.* [Miscellanea.] *Acta Tropica.* Basle. 1958, v. 15, No. 2, 169–73, 6 figs.

The authors record the finding, in monkeys (*Cercopithecus albogularis*) imported to Germany from South Africa, of the malaria parasite *Hepatocystis kochi.* They describe its development in the liver and stages in the blood, which conform to the life cycle described by Garnham [this *Bulletin*, 1948, v. 45, 683]. Attempts were made to elucidate the transmission of *H. kochi*, by feeding mosquitoes, *Aëdes aegypti*, on

infected monkeys and examining lice, *Pedicinus patas*, which parasitized these animals. but in no case was any development of the parasite observed in these insects. *C. A. Hoare*

GARNHAM, P. C. C. **A Malaria Parasite of the Hippopotamus.** *J. Protozoology.* Utica. 1958, May, v. 5, No. 2, 149–51, 7 figs.

This is the first record of the occurrence of a malaria parasite in a hippopotamus; the animal came from Northern Rhodesia. The blood films contained only young and mature gametocytes, while sections of the liver revealed exo-erythrocytic forms represented by mature merocysts. On the basis of these characters the parasite is referred to the genus *Hepatocystis* as *H. hippopotami* sp. n. Unlike most other members of this genus, which occur in forest animals, this species comes from a host living in a swampy habitat. The different stages of *H. hippopotami* are depicted in figures and photomicrographs.

C. A. Hoare

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

DEROOVER, J. Modifications de l'aspect de la trypanosomiase humaine à Tr. gambiense dans un vieux foyer, sous l'influence des méthodes modernes de prophylaxie et de thérapeutique. [**Modification of the Aspect of** *Trypanosoma gambiense* **Infection in an Old Focus as a Result of Modern Methods of Prevention and Treatment**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 149–78.

This paper deals at some length with various aspects, especially diagnosis and treatment, of sleeping sickness in a forest area with many small villages harbouring a very mobile population of 5,000 inhabitants engaged primarily in fishing. Of these some 1,500 were under close observation. In 1944 about 10% of the population were found to be infected, and so twice yearly medical inspections were arranged. At this time the incidence of tryparsamide-resistant infections was found to be fairly high, but it has become substantially higher since then. In 1947–8 pentamidine treatment was introduced; following this the incidence of new cases fell to under 7% of the population, and this figure has been maintained to date. Though pentamidine has proved a most valuable drug, even when given in the early stages of infection it cures only 70% of patients. Its use, however, does not increase resistance to

the other trypanocidal drugs. Nevertheless pentamidine does render parasitic diagnosis more difficult when it has failed completely to cure, by reason of its "parasitological camouflage" effect; the consequent delay in diagnosis happily has not been associated with any increase in neurotropism of the infection.

Since 1954 arsobal has been available; it has proved therapeutically effective at all stages of the disease, and particularly in the advanced stage when tryparsamide rarely is of any value. Its toxic effects have been shown neither to be cumulative nor proportional to the dosage given; the case mortality during treatment has been 2%.

Whenever control of trypanosomiasis in this area has been relaxed the disease has flared up; the need for sustained periodic survey and control is therefore obvious.

The results are set out in great detail in tables. *A. R. D. Adams*

See also p. 112, East African Trypanosomiasis Research Organization. **A Field Key to the Savanna Genera and Species of Trees, Shrubs and Climbing Plants of Tanganyika Territory. Part I: Genera and Some Species** [Burtt].

Davies, J. B. **An Attempt to eradicate** *Glossina palpalis* **(R.-D.) and** *G. tachinoides* **Westw. from Riverine Vegetation in Benue Province, Northern Nigeria, by spraying with DDT.** *Bull. Entom. Res.* 1958, Sept., v. 49, Pt. 3, 427–36, 2 figs. on pl. & 4 text figs.

The control of *Glossina palpalis* and *G. tachinoides* in the Benue Province by normal partial clearing has become uneconomic owing to the increasing cost of labour. A field experiment was carried out, between 1955 and 1957, with DDT as a method of eradication, along an $8\frac{1}{4}$ mile section of a tributary (Abeba) of the River Konshisha. Another tributary (Avende) was kept under observation as a control. Most of the rivers contain running water throughout the year and strips of rain forest, up to 1,000 yards wide, are found along them. The wet season is from March to November. Spraying was carried out by 2 teams, each with 5 men and 2 Eclipse Warley knapsack sprayers. The insecticide was mixed at the spraying site, and a 50% wettable powder, diluted to 5 or $2\frac{1}{2}$%, was found to be the most suitable form to use. The insecticide was sprayed along the river bank and, on occasion, also over the vegetation up to 20 yards from the bank. The first treatments were carried out between January and May 1955, and were followed by further treatments between December 1955 and March 1956.

After the application of DDT in 1955 the numbers of *G. palpalis* decreased, but eradication was not obtained until 1956, when no flies were captured for a period of 124 days between February and June, although the population of this species along the control river remained

high and fairly stable over this period. The flies did not reappear along the treated river until September, except for one male captured in June. A small population developed during the first half of 1957, although no flies were captured later in the year.

With *G. tachinoides* the results of the trial were inconclusive as there was little difference between the populations of the treated and untreated rivers, the populations along both rivers decreasing during the trial period. Along the control river this decline may have been due to the clearing of part of this river, with the intention of isolating and preventing re-invasion of the treated river.

The cost of spraying was estimated to be about half that of clearing by normal methods. An isolated town has also been sprayed with DDT and this has apparently eliminated the tsetse fly population. [See also this *Bulletin*, 1958, v. 55, 873.] *B. R. Laurence*

Larivière, M. Réceptivité du *Cricetomys gambianus* (Rat de Gambie) au *Trypanosoma gambiense*. [**Susceptibility of** *Cricetomys gambianus* **to** *Trypanosoma gambiense*] *C.R. Soc. Biol.* 1957, v. 151, No. 7, 1349–51.

Cricetomys gambianus [the Gambian rat] proved to be an excellent host both for isolating and maintaining *Trypanosoma gambiense*. Wild-caught rats were used and their blood was found to be naturally infected with *Grahamella* and *Spirochaeta duttoni*, though never with *T. lewisi*. Lymph juice from an African from Casamance, containing trypanosomes, was inoculated into a white mouse and a Gambian rat. The mouse developed a low infection (up to 1 trypanosome per 50 fields) and died on the 252nd day; the rat developed a high infection (up to 28 trypanosomes per field) and died on the 154th day. The strain died out quickly in passage in mice, but attained great virulence in rats. The latter line became very infective to mice and white rats but the course of the disease in these animals was never as regular or constant as in the Gambian rat. Another isolation was made from the cerebrospinal fluid of a human being with the disease, which behaved in a similar way.

P. C. C. Garnham

Werner, H. & Kunert, H. Über die Ursache von congenitalen Protozoen-Infektionen. [**The Cause of Congenital Protozoal Infections**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 17–27, 3 figs. [14 refs.]

It has previously been shown that congenital infection with pathogenic protozoa does not occur unless the embryonic membranes are damaged [this *Bulletin*, 1955, v. 52, 879; 1956, v. 53, 1221], and that in the case of *Plasmodium berghei* this can be produced by injecting pregnant females with Euphyllin.

In the present paper an account is given of experiments designed to determine whether Euphyllin had the same effect upon infections with trypanosomes, and also to ascertain the mechanism of its action. In one series of experiments, congenital transmission was demonstrated in foetuses removed from female mice which had been infected with *Trypanosoma gambiense* and *T. cruzi* after preliminary treatment with Euphyllin. In other experiments, in which pregnant mice were infected with trypanosomes or *P. berghei* from 1 to 24 hours after such treatment, it was established that transmission of the infection to the offspring took place 2–3 hours after injection of Euphyllin. Finally, a comparative histological study of the placenta of normal and infected female mice, some treated and some untreated with the chemical, revealed structural changes in those animals which were injected with Euphyllin. These changes were manifested in swelling of the cells and vacuolization of the syncytium, which apparently enabled the parasites to penetrate through the placenta and infect the foetus. *C. A. Hoare*

Levaditi, J. C., Jonchère, H. & Husson, R. Passages intracérébraux ininterrompus effectués de souris à souris avec *Plasmodium berghei*, *Trypanosoma brucei*, *T. equiperdum*, *T. congolense* et *T. gambiense*, en vue de la recherche d'un neurotropisme éventuel. [**Continuous Intracerebral Passage in Mice of** *P. berghei*, *Trypanosoma brucei*, *T. equiperdum*, *T. congolense* **and** *T. gambiense* **in Attempts to produce Neurotropism**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 373–84. [14 refs.]

So far a neurotropic strain of malaria is not known but neurotropism in certain species of trypanosomes has been described, for example in that of *Trypanosoma gambiense* var. Yaoundé described by Roubaud and Caubet [this *Bulletin*, 1946, v. 43, 418]. The authors have sought, by continuous passage from brain to brain in mice, to produce neurotropic strains of *Plasmodium berghei* and of the trypanosomes named in the title. For this purpose homogenates were made of infected mouse brains and inoculation by the intracerebral as well as by the intraperitoneal route for comparison was carried out. The character of the infection did not change but the prepatent period was longer and the course of the disease more prolonged in the animals inoculated intracerebrally, probably as a result of receiving a smaller inoculum. Only red cells became infected with *P. berghei*. The three strains of animal trypanosomes, *T. brucei*, *T. equiperdum* and *T. congolense* were passaged intracerebrally on 40, 25 and 70 occasions respectively, all with negative results as regards the production of neurotropism. The Yaoundé strain of *T. gambiense* isolated from a human patient in 1934 [*ibid.*, 1939, v. 36, 746] and subsequently kept in laboratory hosts gives rise to infection with low parasitaemia of chronic character and produces nervous

manifestations. Several other interesting characters of this strain are given in the text. After 6 direct intracerebral passages the pathogenicity of the strain was not altered and neurotropism was not accentuated. The histological findings confirmed what was observed clinically.

J. D. Fulton

Goble, F. C., Boyd, J. L. & Singer, I. **Effects of Certain Antiorgan Sera on Experimental Malaria and Trypanosomiasis in Mice.** *J. Immunology.* 1958, Mar., v. 80, No. 3, 204–14, 4 figs. [30 refs.]

Rabbits and other animals may be immunized against various (reticulo-endothelial) organ extracts and the inoculation of such immune sera into other animals, suffering from malaria, trypanosomiasis or other parasitic infections produces two opposite effects, according to the amount of antibody administered: a small dose stimulates while a large dose depresses the activity of the reticulo-endothelial system with, respectively, a cure or enhancement of the infection.

This procedure was tested in mice infected with *Plasmodium berghei*, *Trypanosoma congolense* and *T. gambiense*, and inoculated with anti-mouse-spleen sera in the malaria cases and with a variety of anti-organ sera in the trypanosomiasis cases. Little or no effect on the acute infections produced by *P. berghei* and *T. gambiense* occurred, but the phenomenon (as described above) was observed in the chronic *T. congolense* disease. At dose levels of 0·5 or 0·1 cc. of anti-sera, given intraperitoneally the day before infection or the day of infection, the infection flared and death occurred more quickly than in controls; at a dose level of 0·025 or 0·01 cc. there was an increase in the time of survival. This anti-serum had no effect on the trypanosomes *in vitro*; the most effective material was prepared from desiccated spleen and from bovine lymphatic substance, while anti-thymus, anti-bone-marrow and anti-blood sera were practically inert. *P. C. C. Garnham*

Lippi, M. & Benedetto, A. Variazioni della glicemia in corso di trianosomiasi sperimentale nella cavia da *Trypanosoma brucei*. [**Variation in Glycaemia in Experimental** *Trypanosoma brucei* **Infection in Guineapigs**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, July, v. 39, No. 7, 446–51. [34 refs.]

Tobie, Eleanor J., with the technical assistance of H. D. James, Jr. **The Cultivation of** *Trypanosoma congolense in vitro*. [Research Notes.] *J. Parasitology.* 1958, Apr., v. 44, No. 2, 241–2, 1 fig.

The author reports the cultivation of *Trypanosoma congolense* in the diphasic blood-agar medium devised by her and her associates some years

ago [this *Bulletin*, 1950, v. 47, 604]. For successful isolation, it is necessary to add human—instead of rabbit's—blood to the initial culture and first subculture, but in subsequent transfers rabbit's blood can be used. The culture is now maintained by regular transfers made every 8–12 days and incubated at 24–25°C. In culture the flagellates assume the trypanosome form, corresponding to that found in the tsetse midgut. However, the cultural forms proved to be non-infective to rats, irrespective of the age of the culture. [It would seem, therefore, that metacyclic trypanosomes do not develop in this medium.] *C. A. Hoare*

Meyer, H., De Oliveira Musacchio, M. & De Andrade Mendonça, I. **Electron Microscopic Study of *Trypanosoma cruzi* in Thin Sections of Infected Tissue Cultures and of Blood-Agar Forms.** *Parasitology*. 1958, May, v. 48, Nos. 1/2, 1–8, 23 figs. on 6 pls. (1 coloured). [11 refs.]

The fine structure of *Trypanosoma cruzi* was studied by electron microscopy of sections of cultures grown in tissue cells and in blood-agar medium. The material was fixed in osmic acid and embedded by Palade's method, after which it was sectioned and examined in the electron microscope. In addition, fixed and washed trypanosomes were examined directly on parlodion-coated grids.

The structure seen in the various stages of development of *T. cruzi* (leishmanial, crithidial and trypanosome forms) is described in detail and illustrated by a number of photomicrographs. However, the authors' interpretation of the cytology of this organism can be followed more easily in a series of schematic figures.

The body of the flagellate is invested in a double membrane (one of which, the periplast, is striated), and contains a large nucleus, which has a granular structure with lighter and darker inclusions. The kinetonucleus [= kinetoplast] is formed by a vacuole-like space with a dark ring-like inclusion, containing fine granules in the centre and darker masses on the periphery. The flagellum is represented by a bundle of 11 axial fibres embedded in a homogeneous matrix, 9 of which are peripheral and 2 central. Each fibre originates from a "basal corpuscle", this aggregation of corpuscles constituting what is conventionally known as the blepharoplast. Though lying near the kinetoplast, it is not connected with it. As the leishmanial forms elongate to form crithidial and trypanosome stages, the flagellum and kinetoplast migrate backwards, pushing the surface membrane of the body inwards in the form of an invagination. In the trypanosome stage, the typical structure of the kinetoplast described above is lost, and it is replaced by a large vacuole, in which the dark masses—constituting the kinetoplast in other stages of the flagellate—are probably dissolved or changed in some other way. *C. A. Hoare*

Romaña, C. & De Romaña, M. S. Valor comparativo de la reacción de fijación de complemento y del xenodiagnóstico en un grupo de chagásicos crónicos. [**Comparative Value of the Complement-Fixation Reaction and Xenodiagnosis in a Group of Chronic Cases of Chagas's Disease**] *An. Inst. Med. Regional.* Resistencia, Argentina. 1957, Dec., v. 4, No. 3, 245–54, 3 graphs. French summary.

The authors, from Argentina, studied the relative diagnostic values of the complement-fixation test (CFT) and xenodiagnosis in 433 patients, mostly in the chronic stage of Chagas's disease. The study was made in respect of 3 groups (1) 321 patients examined simultaneously by both methods. (2) 174 patients who at some time had at least 1 positive xenodiagnosis and (3) all the 433 patients examined by each test on distinct occasions.

The results are set out graphically and notes are given about some individual patients with discrepant results.

In group (1) the CFT was positive in 68%, both tests were positive in 30% and neither in 2%. Thus the CFT revealed 98% of positive cases. In group (2) the CFT was positive in 93% and the xenodiagnosis in 65%. The authors point out that xenodiagnosis will not always prove to be positive in infected persons, because of the temporary disappearance from the blood of *T. cruzi* which is essentially a tissue parasite. In group (3) the CFT was positive in 93·6% and xenodiagnosis in 35%.

The authors conclude that the CFT is a much more sensitive diagnostic test than xenodiagnosis but add that a single negative CFT does not exclude Chagas's disease and it is wise to repeat it several times.

H. J. O'D. Burke-Gaffney

Veiga, A. A. & Fiorillo, A. M. A proteína C-reativa na forma crônica da moléstia de Chagas. [**C-Reactive Protein in Chronic Chagas's Disease**] Reprinted from *Hospital.* Rio de Janeiro. 1958, Apr., v. 53, No. 4, 545–51, 2 figs. English summary.

As inflammatory changes in the myocardium and in the muscular coat of the intestinal tract occur in Chagas's disease, the authors, from São Paulo, Brazil, set out to discover whether these changes were accompanied by the appearance of C-reactive protein in the circulation.

They examined 51 cases of chronic Chagas's disease confirmed by complement fixation. The determination of C-reactive protein was carried out by precipitation in capillary tubes and the test was judged to be positive if a column of precipitation of not less than 1 mm. appeared after 2 hours' incubation at 37°C. and 12 hours at room temperature. 17 of the patients had evidence of megacolon or megaoesophagus and 29 had cardiac manifestations.

The results are shown in figures. The test was positive in 14 patients. Although positive tests were rather more frequent in patients with the changes mentioned, this was not statistically significant. It is concluded

that a positive test for C-reactive protein is not of significance in chronic Chagas's disease. These findings are discussed.

In 4 cases, serial tests were performed and 2, initially negative, eventually became positive. This seemed to be related to aggravation of the clinical manifestations. Post-mortem findings in these 2 cases are set out and discussed. *H. J. O'D. Burke-Gaffney*

Romaña, C. "La placa seudoerisipelatosa" en la enfermedad de Chagas. [**The Pseudo-Erysipelatous Plaque in Chagas's Disease**] *An. Inst. Med. Regional.* Resistencia, Argentina. 1957, Dec., v. 4, No. 3, 271–4, 1 fig. on pl. French summary (6 lines).

The author, from Argentina, describes a lesion on the left arm of a woman of 33, which took the form of a furunculoid swelling with redness and painful swelling of the adjacent skin. The related axillary glands were swollen and painful. In other parts of the body "metastatic chagomas" were seen. *Trypanosoma cruzi* was not found in the patient's blood, but xenodiagnosis was positive. The patient received a few injections of Antimon (Roche) but these had to be suspended because of pain. However, the lesions disappeared and the author attributes this clinical improvement to the natural evolution of the disease. Unfortunately, no biopsy of the lesion was made. The author speculates whether it was caused by the parasite itself or by a secondary infection of the "inoculation chagoma". He considers that the name "pseudo-erysipelatous plaque" should be reserved for this type of spreading inflammatory lesion at the point of entry of the infection, which should be distinguished from the "inoculation chagoma" itself.

The lesion is illustrated in a photograph.

H. J. O'D. Burke-Gaffney

Freire, R. S. Hidrocele agudo chagásico. (Observaciones personales.) [**Acute Hydrocele in Chagas's Disease**] *An. Inst. Med. Regional.* Resistencia, Argentina. 1957, Dec., v. 4, No. 3, 255–64, 4 figs. on 2 pls. French summary (7 lines).

An account of 3 cases.

De Bustamante, F. M., De Carvalho, A. G., Verano, O. T. & Padilha, C. Observações sôbre a ação dos inseticidas Dieldrin e BHC contra o *Triatoma infestans* no interior das habitações. [**Observations on the Action of Dieldrin and BHC against** *Triatoma infestans* **inside Houses**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 305–11. English summary (7 lines).

The English summary appended to the paper is as follows:—

"The paper furnishes the results of a field experiment carried out in

the county (município) of Anápolis, State of Goiás, to compare the effect of indoor spraying of Dieldrin with that of BHC, against *Triatoma infestans*.

"The authors found that BHC (0·5 gr of gamma isomer per square metre) gave better results than Dieldrin (1 gr per square metre) contrarily to the results announced in Venezuela and in Guatemala with Dieldrin against *R. prolixus* and *T. dimidiata*."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Chatterjee, A. N. & Ghosh, J. J. **Metabolism of Sucrose by** *Leishmania donovani*. *Ann. Biochem. & Exper. Med.* Calcutta. 1958, v. 18. No. 3, 69–76, 1 fig. [18 refs.]

"1. A sucrose-splitting enzyme has been detected in the crude cell-free extracts of *L. donovani*.

"2. Unlike yeast or mould enzymes, this protozoal enzyme has been shown to be purely hydrolytic in nature, splitting sucrose into a mixture of free glucose and free fructose.

"3. The various properties of this enzyme, namely *p*H optima, K_m value, temperature of inactivation, cofactor requirement, etc. have been studied.

"4. A possible mechanism of sucrose breakdown by the cell-free extracts of *L. donovani* has been outlined in the discussion."

Rodrigues da Silva, J. & De Paola, D. Alterações histoquímicas do sistema retículo-endotelial hepático no calazar. [**Histochemical Changes in the Reticulo-Endothelial System of the Liver in Kala Azar**] Reprinted from *Med. Cirurg. Farmacia*. 1957, June, No. 254, 211–15, 5 figs. (2 coloured on pl.) [10 refs.] English summary.

The authors, in Brazil, had previously observed in liver biopsies from patients with kala azar an intense hypertrophy and hyperplasia of the Kupffer cells, which were heavily parasitized. There was marked proliferation of the argyrophile fibres, leading to an intracellular fibrosis.

They have now studied 15 cases of kala azar, confirmed by finding of the parasite in the bone marrow and supported by clinical and laboratory findings and by the favourable response to pentavalent antimonials. In some cases, the parasite was identified in liver biopsies. The study was

directed primarily to investigation of histochemical changes in the Kupffer cells.

6 patients were adults and 9 were children and in the 13 cases where it could be determined the duration of the disease was from 2 to 48 months.

Fragments from liver biopsy, after fixation, were subjected to serial section and stained with haematoxylin and eosin, and also by Gomori's method and Perdrau's silver impregnation method for reticular fibres. For histochemical studies, the periodic-acid-Schiff method and the methyl-pyronin green technique were used.

The results are discussed and illustrated in 5 figures, 2 of them in colour. The main finding was that the polygonal cells of the liver were preserved, which was in contrast with the variation in ribonucleins and with the increase of polysaccharides linked to globulins in the Kupffer cells.

The findings suggest that the reticulo-endothelial changes in kala azar " are concerned in the proliferation of the argyrophilal fibers of the liver, as well as in the disproteinemia, conditions which are peculiar to the disease ". *H. J. O'D. Burke-Gaffney*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Roger, F. & Roger, A. Une variante simple d'emploi du colorant de Wright utilisable avec les rickettsies et les virus de groupe Trachome-Psittacose-Lymphogranulomatose. [**A Simple Modification of the Use of Wright's Stain for Staining Rickettsiae and Viruses of the Trachoma-Psittacosis-Lymphogranuloma Group**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 307–9.

Consistently satisfactory staining of rickettsiae and viruses of the trachoma-psittacosis-lymphogranuloma group was obtained by the following procedure:

Stock strain: A solution containing 1 gm. of Wright's stain in 100 ml. of methanol is left in the waterbath at 37°C. for 2 hours with occasional shaking, then filtered.

Rapid method: A thin smear is dried in air and fixed for 1 minute in methanol. When dry, the smear is covered with an aqueous staining solution prepared by diluting the stock stain in the

proportion of 1 drop of stain to every 2 ml. of distilled water (shaking after the addition of each drop of stain). The staining solution is left until a precipitate begins to appear (about 10 minutes). The smear is then washed with slightly alkaline water and placed vertically to dry, without heating.

Slow method: As above, except that the stock stain is diluted in the proportion of 1 drop to every 4 ml. of distilled water.

Both methods have given better results than those obtained with other techniques, particularly in the demonstration of rickettsiae in organ smears made during the period of chronic infection.

R. S. F. Hennessey

Giroud, P., Le Gac, P. & Dumas, Nicole. La conservation à basse température n'a pas modifié le comportement de la souche de typhus épidémique isolée du sang de caprins en Éthiopie. [**Strain of Epidemic Typhus Isolated from a Goat in Ethiopia Unmodified by Preservation at Low Temperature**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 304–6.

The characteristics of a rickettsial strain [previously identified as *Rickettsia prowazeki*] which had been isolated from the blood of a goat in Addis Ababa [this *Bulletin*, 1957, v. 54, 801] remained unchanged after storage for 19 months at −25°C. The rickettsiae took up stain with unusual intensity, and their pathogenic properties and antigenicity were those of a strain of the epidemic type. The authors emphasize the value of preliminary serological tests, such as the micro-agglutination test, when attempting to isolate rickettsiae by inoculation of animals with material from potential hosts; these tests were employed in Ethiopia, leading to the isolation of an epidemic typhus strain from a domestic animal. "*Mais il fallait croire à ces tests.*" *R. S. F. Hennessey*

Minkenhoff, J. E. & Gispen, R. Een laat recidief van vlektyfus. [**A Late Relapse of Typhus (Brill-Zinsser)**] *Nederl. Tijdschr. v. Geneesk.* 1958, Sept. 20, v. 102, No. 38, 1852–4. [11 refs.] English summary (6 lines).

This is a clinical report of a remarkable case of a deferred relapse in louse-borne typhus (Brill-Zinsser disease). A woman developed serous meningitis with pyrexia. Serological evidence showed that the meningitis was indeed a symptom of relapse of an earlier infection due to *Rickettsia prowazeki*. The complement-fixation reactions with *Rickettsia prowazeki* and *R. mooseri* antigens, respectively, were 1 in 16 and 1 in 32 rising to 1 in 512 in each case after 1 week. The Weil-Felix reaction maintained a titre of only 1 in 80 throughout. Enquiry produced evidence that the

patient had been in a concentration camp during the war and that typhus was probably present there at that time. This is the first such case reported in the Netherlands. *Philip Manson-Bahr*

Bojanowska, Anna, Goszczyńska, Krystyna & Domiczstyczyńska, Bogumiła. Działanie sześciochlorocykloheksanu na jajeczka wszy *Pediculus humanus vestimenti*. [**The Effect of Gammexane (BHC) on Nits of Lice** *Pediculus humanus corporis*] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 3, 301–9, 2 figs.

The English summary appended to the paper is as follows:—

"The toxic properties of gammexane were tested upon nits of lice *Pediculus humanus vestimenti*. The activity of the pure gamma isomere of HCH called Lindane was compared with a technical product containing 33% gamma isomere of HCH mixed with other isomers. It was ascertained that the toxicity of these insecticides is different. The LC_{50} established for Lindane was 0.5/mg/cc in the confidence interval (0.45–0.56) whereas the LC_{50} for technical HCH was ascertained as amounting to 10.0 mg/cc in the confidence interval (9.1–11.0)."

Balaeva, N. M. & Zubok, L. P. **Study of the Biological Properties of** *Rickettsia mooseri* **during Prolonged Cultivation in Clothes Lice. II. Oxidizing Power of Mooser Rickettsioses in the Presence of Glutamic Acid.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1088–90. [Translated from Russian.]

Sasa, M. **Comparative Studies on the Leg Chaetotaxy of Larval Trombiculid Mites of Japan. (Studies on Tsutsugamushi, Part 101).** *Japanese J. Exper. Med.* 1958, Feb., v. 28, No. 1, 11–34, 33 figs. [11 refs.]

The chaetotaxy of the legs of the larvae of 50 species of trombiculid mite of Japan is examined with respect to the numbers of setae present, differences in size and form of setae, and differences in relative position with reference to the chaetotaxy of *Trombicula akamushi* as the type pattern. This species is not only of medical importance but is of a group, the subgenus *Leptotrombidium*, in which the chaetotaxy is fully developed and less modified than in other groups. The indications are that phylogenetic relationships between species and species-groups may be usefully analysed by studies along these lines. There are 33 line drawings depicting details of setae on the legs of the larva of one or more species of *Trombicula*, *Euschöngastia*, *Neoschöngastia*, *Doloisia*.

Mackiena, *Gahrliepia* and *Shunsennia*, with a complementary table. It has not been possible, as yet, to study variations in chaetotaxy which may occur between specimens of any one species. *D. S. Bertram*

Marmion, B. P. & Stoker, M. G. P. **The Epidemiology of Q Fever in Great Britain. An Analysis of the Findings and some Conclusions.** *Brit. Med. J.* 1958, Oct. 4, 809–16, 3 figs. [Numerous refs.]

Since 1949, when serological evidence of human infection with *Rickettsia burneti* was first obtained in Great Britain [this *Bulletin*, 1949, v. 46, 454], the authors of this paper have been closely concerned with investigations of potential animal reservoirs and the mode of transmission to man [see, for example, *ibid.*, 1955, v. 52, 526; 1956, v. 53, 983, for further references]. They now assemble the results of studies by various workers, together with recent findings of their own.

Although *R. burneti* has been isolated from the pooled milk of cattle in many parts of the country, serological surveys suggest that infection rates are low. Only 2 out of 446 cattle in Kent (an endemic area) had Q fever antibody, whereas 8–12% of herd milks yielded rickettsiae. Antibody rates between 1·6% and 3·5% were found in sheep sera from south east England (Kent) and Wales; positive tests were also given by sheep sera collected at Glasgow. *R. burneti* was isolated from 2 out of 96 placentas from serum-positive ewes in the Romney Marsh (Kent) and also from ticks (*Haemaphysalis punctata*) collected from an infected flock of sheep in the same area. There appeared to be an association between cattle infection and the presence of sheep or sheep ticks, or both, in this part of Kent. Antibodies were found in 46 out of 341 (13·5%) sera from domestic hens in Kent, but not in 49 sera from hens in East Anglia (where infection is rare).

Q fever in man has occurred in most parts of the Midlands and Southern England, chiefly in persons of working age. In East Anglia and Kent, antibodies were about twice as common in healthy adults who were occupationally exposed to cattle and sheep as in those who were not so exposed. In rural Kent, the disease seemed to be most prevalent in the period April to July, when sheep were most likely to have been the source of infection; in an urban area, where sporadic cases occurred all the year round, cow's milk was the most probable source.

"Our information about the epidemiology of the disease in Great Britain as a whole is still quite limited. The indications from the most closely studied county, Kent, are of [a] localized and complex endemic focus in which ticks and sheep are infected, with spread of infection from the latter to cattle and possibly to other creatures in contact, such as chickens. The distribution of sporadic cases and outbreaks of Q fever in man corresponds to the intensity of stocking with sheep in Kent, but it is clear that infection does not always spread from them to man by

the most direct route. Studies elsewhere in Great Britain might well show different combinations of hosts and different routes of spread of infection."

[This paper contains a great deal of information, with a valuable discussion of the epidemiological implications.] *R. S. F. Hennessey*

Melnotte, P., Nivière, J. & Debry, G. Un deuxième cas de fièvre Q autochtone en Lorraine. [**A Second Autochthonous Case of Q Fever in Lorraine**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 298–300, 1 chart.

A soldier stationed at Commercy (Meuse) became ill in November 1957 with headache, lumbar pain and fever. Clinical and radiological signs of infiltration of the left lung became apparent on the eighth day. Treatment with streptomycin and Rimifon [isoniazid] was instituted. The temperature was normal by the thirteenth day and the radiological picture was almost clear by the thirtieth day. Specimens of serum collected 40 and 69 days after the onset of illness agglutinated *Rickettsia burneti*; tests for influenzal antibodies were negative on 2 occasions. The patient had been in contact with hay and straw from stables and barns about 10 days before falling ill, and it is thought that rickettsiae were probably inhaled in dust.

A previous case of Q fever occurred at Commercy in 1956, suggesting that an endemic focus of *R. burneti* infection exists in the Department of the Meuse. *R. S. F. Hennessey*

Vesenjak, J., Spalatin, J., Lovrić, Š., Jamšek, P. & Vodička, L. Epidemija Q-groznice na otoku Uljanu. [**An Epidemic of Q Fever on the Island of Uljan**] *Radovi Med. Fakul. Zagrebu.* 1957, v. 3, 219–31, 1 map & 1 graph. English summary.

In 1954 an epidemic of Q fever occurred on Uljan, an island of 10,000 inhabitants situated off the Dalmatian coast. The first cases appeared in January, and the outbreak continued until March; there were 91 cases in all, and 41 patients were admitted to hospital. The nature of the infection was not recognized, and it was usually diagnosed as influenza, pneumonia or typhoid. The average duration of in-patient treatment was 8 days. The onset of illness was usually acute, with pyrexia and headache; there were no complications and no fatal cases. By serological examination a retrospective diagnosis of Q fever was established in 36 instances, although negative results were obtained in 5 patients who had been treated in hospital. Antibody was also found in 33 (19·7%) of 238 inhabitants from all parts of the island, and in 28 (13·8%) of 202 domestic animals (sheep and goats) in the village in

which the epidemic occurred. Attempts to isolate *Rickettsia burneti* from milk and placentas of domestic animals were unsuccessful.

D. J. Bauer

Baylet, R. J., Gilbert-Desvallons, Y., Fichez, Berton & Vaillant. Syndromes pseudo-grippaux à Dakar. Fièvre Q. [**Pseudo-Influenzal Syndromes at Dakar. Q Fever**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 359–65. [This also appears in *Rev. Méd. Nav.* (*Métropole et Outre-mer*). Paris. 1958, v. 13, No. 3, 289–95.]

This paper describes 4 cases diagnosed as Q fever at Dakar during 1956–57. All 4 patients were Europeans (1 ship's quartermaster, 2 members of Service establishments, 1 nurse) who suffered from a fever of sudden onset with headache and muscle and joint pains. 1 patient showed a fleeting macular rash on the arms and shoulders on the third day. Radiological examination of the lungs was negative in 2 patients; the others had no clinical signs of pulmonary involvement. The symptoms disappeared in 6–7 days, leaving considerable weakness. 3 patients had relapses (clinically similar to the primary attack), 1 patient having 2 such episodes in 3 months.

Convalescent serum from the 4 patients agglutinated *Rickettsia burneti* at titres over 1 in 20, and it is thought that all were examples of the pseudo-influenzal form of Q fever. Attempts to isolate *R. burneti* from 2 patients were unsuccessful; a guineapig inoculated with blood from one of them had a rise of temperature and showed a generalized lympho-reticular reaction consistent with a rickettsial infection.

In a speculative discussion of the epidemiological aspects, it is remarked that pseudo-influenzal affections sometimes occur at Dakar in small epidemics, although more often as isolated cases. Antibody to *R. burneti* has been detected in the serum of a goat, while a strain of this organism has been isolated from a tick (*Amblyomma variegatum*) collected locally. The manner in which the 4 human infections were acquired is unknown.

R. S. F. Hennessey

Di Salvo, A. F. & Wertman, K. **A Serological Survey of Q Fever in Arizona.** *J. Amer. Vet. Med. Ass.* 1958, Oct. 1, v. 133, No. 7, 383–5, 1 fig. [12 refs.]

" A complement-fixation test was employed to determine the incidence of antibodies to *Coxiella burnetii*, the causative agent of Q fever, in the sera of domestic livestock in Arizona. Of the 751 cattle, sheep, and goats tested, 229 (30·5%) fixed complement in a dilution of 1:5 or greater.

" In dairy cattle, there was a high percentage of positive reactors with relatively high titers while, in beef cattle from range areas, the percentage of positive reactors was low.

"Although serum from only a few sheep and goats was tested, the reactions were similar to those found in cattle of the same area."

Silich, V. A. **The Survival of *Rickettsia burneti* in Infected Meat in Storage Conditions.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 5/6, 816–18. [12 refs.] [Translated from Russian.]

Meat and meat products play an important part in transmission of the infective agent of Q fever. In recent years a great deal of information has been collected in the Soviet Union on Q fever among workers in the meat industry, and there are numerous indications in the literature that in this occupational group persons in immediate contact with the blood, viscera and meat of sick animals contract the disease more often [this *Bulletin*, 1958, v. 55, 1214]. Infection can take place both by contact with meat and blood during the processing of carcasses and during preparation of food and the use of inadequately cooked meat for food, but this question has not yet received sufficient study and in particular there are no findings at all on the duration of survival of *Rickettsia burneti* in infected meat under storage conditions.

Experiments made by the author showed that *R. burneti* stored in a 10% solution of NaCl in a refrigerator retained its vitality for 270 days (the period of observation). The untreated meat of infected animals retained its infectivity during refrigeration for at least 30 days, kidneys and spleen for 15 days (period of observation). The organism survived in salted meat for at least 150 days, and in the kidneys and spleen for at least 60 days.

These results confirm epidemiological observations on the possibility of infection with Q fever through meat of infected animals, fresh or salted. *P. A. Clearkin*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Van der Kuyp, E. **Yellow Fever in Surinam.** *Trop. & Geograph. Med.* Amsterdam. 1958, June, v. 10, No. 2, 181–94. [Numerous refs.]

Most of this paper gives the history of yellow fever in Surinam, records of which go back to the 18th century. In the capital city, Paramaribo, where 40% of the population reside, yellow fever has not been reported since 1909, although in June 1948, when a mosquito control service was established, *Aëdes aegypti* was found in 42·1% of the premises in the

capital. In 1953, in the same month, 9·3% of the premises were found to be infested. Yellow fever vaccine was first used in 1949. Since 1948 water containers have been treated with DDT and residual spraying in houses was begun in 1949. There is evidence, presented in a table, that *Aëdes aegypti* in Surinam is now resistant to DDT.

It was demonstrated by mouse protection tests that jungle yellow fever is present in the interior, which is inhabited by Bush Negroes, especially among male adults who are woodcutters; it is also present in the savannah region, inhabited by Amerindians, and near the Brazilian border. *Haemagogus equinus* and *H. spegazzinii falco* have been recorded from Surinam.

It is not clear why urban epidemics do not occur in the villages of the interior, where *Aëdes aegypti* is present, or along the coastal agricultural area, including Paramaribo, where 90% of the population live. Some of the reasons for this are discussed [see also this *Bulletin*, 1947, v. 44, 993].

B. R. Laurence

Galindo, P. **Bionomics of *Sabethes chloropterus* Humboldt, a Vector of Sylvan Yellow Fever in Middle America.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 429–40, 5 figs. & 1 pl. [11 refs.]

A study of laboratory-reared *Sabethes chloropterus* showed the species to be stenogamous and anautogenous, the blood meals being provided by guineapigs or rhesus monkeys. Blood meals were taken mainly during the early afternoon hours, the peak of biting activity not occurring until the second or third week after emergence, the earliest being the fifth day. Biting took place chiefly on the nose and lips. Oviposition took place in water-filled bamboo pots with holes 1 inch in diameter in the side, eggs being spasmodically ejected into the water by the hovering female. Oviposition extended from the third day after a blood meal to the thirteenth, each female laying an average of 138 eggs in her lifetime.

At 26°C. the mean larval period from hatching to pupation was 14·8 days, the period of pupation having a mean value, at the same temperature, of 150 hours.

The mean life span of females after the first blood meal, when maintained at temperatures between 26·1 and 26·8°C. and relative humidities between 92 and 97%, was 38·9 days with a maximum of 140 days.

E. R. Nye

De Roever-Bonnet, H. & Hoekstra, J. **Yellow Fever Vaccination by Scarification with 17D Vaccine.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 289–91.

This paper provides the results of yellow fever vaccination made by scarification with 17D virus at the Royal Tropical Institute, Amsterdam, on 116 test persons—all doctors or medical students, none of whom

had ever been in a yellow fever region. The vaccine was suspended just before use in a sterile solution of gum arabic in distilled water and approximately 30,000 intracerebral mouse LD50 were applied to the arm of each test person. Vaccination was performed over the site of insertion of the deltoid muscle, after the area had been cleansed with ether: the skin was first tightly stretched and then 2 or 3 superficial scratches of about 0·5 cm. in length were made on the stretched area with a vaccino-style, which had been dipped in the vaccine suspension. Blood samples from each test person were obtained before and 3–4 weeks after vaccination, both samples being simultaneously subjected to mouse protection tests.

No yellow fever antibody was demonstrable by these tests in any of the pre-vaccination sera, but of the 116 post-vaccination sera 108 gave positive results, 3 were inconclusive and 5 remained negative. Vaccination had, therefore, conferred immunity on 93% or, if the inconclusive results are combined with the positives, on 96% of the total vaccinated. Duration of this acquired immunity was investigated over a comparatively limited period in 4 persons, among whom 1 gave an inconclusive result after an interval of 9 months, and 3 were still immune 2, 2½ and 3½ years, respectively, after vaccination. Reactions, none serious, were relatively common both before and after the 6th post-vaccination day; these were regarded as either allergic or due to the immunizing virus itself.

In discussing the foregoing results the authors consider it improbable that the percentage of positives would have been higher had the skin not been cleansed with ether before scarification, and, with regard to the numerous post-vaccination reactions in their series, refer to the many allergic and non-allergic reactions reported by other workers to have followed vaccination with 17D virus. [From Cannon and Dewhurst's studies (this *Bulletin*, 1954, v. 51, 567) it would seem important that the skin at the site of vaccination should not be cleaned with ether; this procedure, under certain conditions, gave a lower percentage of positives. Dick (*World Health Organization Monograph Series No. 30*, 1956, p. 97; this *Bulletin*, 1956, v. 53, 872), however, finds it difficult to understand how this could have happened, if the ether had been allowed to evaporate before the vaccine was applied. As regards allergic reactions following the inoculation of 17D vaccine, Kouwenaar (this *Bulletin*, 1953, v. 50, 928) concludes that the risk of such reactions is quite notable and that it will only be overcome when the scarification technique is substituted for subcutaneous injection.] *G. Stuart*

DENGUE AND ALLIED FEVERS

LUMSDEN, W. H. R. **The Etiology of "Dengue".** *East African Med. J.* 1958, Sept., v. 35, No. 9, 519–26. [28 refs.]

This is a review of the causation of dengue-like illnesses. After description of the syndrome, the distribution and aetiological significance of the dengue viruses, West Nile virus, and Chikungunya virus [this *Bulletin*, 1956, v. 53, 1334] are discussed. The main African epidemics of "dengue" are then briefly considered. [Rift Valley fever virus is wrongly classified in group A of arborviruses, and the range of conditions for haemagglutination by some members of groups A and B arborviruses is much wider than indicated.] *C. E. Gordon Smith*

RABIES

DEPOUX, R.; ORIO, J.; MERVEILLE, P.; CECCALDI, J. La rage en Afrique Équatoriale Française au cours des cinq dernières années. I. Activités de l'Institut Pasteur de Brazzaville pour le dépistage de la rage. [**Rabies in French Equatorial Africa during the Last Five Years**] [DEPOUX, ORIO, MERVEILLE & CECCALDI]. *Ann. Inst. Pasteur.* 1958, Sept., v. 95, No. 3, 302–5. II. Activités de l'Institut Pasteur de Brazzaville dans la prévention et le traitement de la rage humaine [ORIO, DEPOUX, MERVEILLE & CECCALDI]. *Ibid.*, 306–13. [14 refs.]

This paper describes in two sections the part played by the Brazzaville Pasteur Institute between 1 January 1953 and 30 June 1957: in section I, the evaluation of the rabies situation in French Equatorial Africa, and in II, the prevention and treatment of human rabies in that federated territory.

I. The disease is shown to be enzootic throughout the territory, as evidenced by the number of positive findings in animal brains submitted from all 4 provinces for laboratory examination. Of 351 such brains examined, 119 (33·9%) proved to be infected with rabies virus, and among these positives 97 derived from dogs, 16 from cats and 6 from monkeys, sheep, antelopes, jackals or civet cats. Although, then, the dog is the principal vector and transmitter of rabies, wild life has also to be reckoned with as a permanent reservoir of the virus. Unfortunately rabies control in animals is, for financial reasons, largely inoperative; there exist, for example, no provisions for the systematic collection and destruction of stray animals or for the compulsory vaccination of household dogs and cats. In connexion with the Institute's research into the occurrence of rabies in wild life, it is of interest to note that to date no

evidence of the virus has been demonstrable in the brains of rats or of fruit-eating bats (*Eidolon helvum*). During the period under review the diagnosis of animal rabies has also been undertaken by the veterinary laboratory at Farcha (Fort-Lamy), where most of the specimens sent from the Chad Province have been examined.

II. Bitten persons receive a course of treatment with 5% phenolized Fermi-type vaccine, prepared and used at the Institute and despatched in the quantities required, to treatment centres in each of the provinces. In the whole territory during the 4½-year period specific treatment was given to 3,605 bitten persons—1,021 Europeans and 2,584 Africans—but, because of unsatisfactory returns made by the provincial centres, only data regarding the 1,876 persons—418 Europeans and 1,458 Africans—treated at the Institute are published. Such data show that, despite treatment, there were 8 deaths—all among Africans and all during treatment or within 15 days after its completion; that among the 8, only 3 occurred in patients who had completed the prescribed course; and that these 3 had first reported at the Institute 8, 19 and 74 days, respectively, after the date of biting. No case of paralytic accident was observed or reported. Human deaths in the Federation during the period totalled 15—8 among the treated and 7 among the untreated—but this total, officially recorded, does not, it is felt, in any way represent the true mortality figure.

Finally "It is evident that prophylaxis of rabies in humans depends on the first place on animal vaccination". Inasmuch as both the Institute and the Farcha laboratory prepare vaccine for animal immunization, no difficulty in carrying out compulsory vaccination of domestic animals periodically would arise, provided appropriate legislation to this end were introduced and enforced. Such vaccination, together with the elimination of stray dogs and the education of the public on rabies and its prevention, would do much to ameliorate the existing rabies situation in the territory. *G. Stuart*

Kuma, N.; Kondo, A.; Yoshino, K.; Kitaoka, M. **Infection of the One-Day Old Fertile Hen's Egg with Rabies Virus. III. Some Observations on High Egg Passage (HEP) Strains** [Kuma]. *Japanese J. Med. Sci. & Biol.* 1958, Apr., v. 11, Nos. 1/2, 31–43, 1 fig. **IV. A Quantitative Analysis of Infective Units for Mice (MIU) and for One-Day Eggs (OIU)** [Kondo]. *Ibid.*, 45–57. [30 refs.] **V. Cultivation of Different Strains in the Egg-White-Replaced One-Day Egg (ERO) with special reference to interference between Adult-Mouse-Pathogenic and Non-Pathogenic Strains** [Yoshino, Kondo, Kuma & Kitaoka. *Ibid.*, 59–71, 2 figs. [23 refs.]

"Two high egg passage (HEP) rabies viruses, Flury and Nishigahara, which had been maintained by more than 200 times repeated 7-day egg

passages and which retained no or little pathogenicity for adult mice, were found to be capable of infecting 1-day eggs and killing their embryos to such an extent that they could be titrated in 1-day eggs without any preliminary 1-day egg passage. The 1-day egg infective unit (OIU) of these viruses seemed to have unity relation with the baby mouse infective unit. The HEP viruses grew much faster in 1-day eggs than in 7-day eggs, and their growth in 1-day eggs was even faster than that of earlier Flury and mouse-brain passaged CVS strains. The peak viral concentration in the embryo was also higher in the 1-day egg infection system as compared with the 7-day egg infection. The two HEP rabies viruses examined revealed some differences in their properties; firstly, HEP Nishigahara virus showed a higher tendency of causing hemorrhage in the embryonic brain when inoculated into 7-day eggs, and secondly it could multiply in the adult mouse brain whereas no such multiplication was detected with our present HEP Flury strain. Furthermore, HEP Nishigahara virus when massively given into adult mice occasionally killed the animals while this was not the case with HEP Flury strain. Box neutralization tests using an antiserum prepared with rabbit-brain passage of CVS strain indicated that both HEP viruses had not changed their antigenic makeup. The reasons why the HEP rabies viruses were highly pathogenic for the 1-day egg and why such different HEP lines appeared were discussed."

[See this *Bulletin*, 1957, v. 54, 1073, 1074.]

"The mouse-fixed CVS strain and its 1-day egg-adapted line COP virus were titrated in three different hosts, adult mice, baby mice and 1-day eggs. With CVS virus, the ratio of adult mouse LD, baby mouse LD and 1-day egg ID titers was roughly 1:10:1/4, whereas with COP virus it was roughly 1:10:10. Box neutralization tests of an antiserum with these two viruses indicated that almost equal mouse LD units of them combined with each serum dilution tested. Hence, one adult- as well as baby mouse LD unit seemed to represent an equal particle number for both strains. Then, the fate in the adult mouse brain of the uninfective portion of seed virus was investigated, but no firm evidence was obtained to support the possibility that inapparent infection took place following inoculation of a single baby mouse-infective unit. This justified the adoption of the term of mouse-infective unit (MIU) for adult mouse LD unit."

"The egg-white-replaced 1-day egg (ERO) technique, which was previously established in the study of herpes simplex virus, was applied to rabies virus. Four mother strains, mouse-fixed CVS, egg-adapted Flury, HEP (high egg passage) Flury, and HEP Nishigahara, and their 1-day egg passage lines were all grown by this method, thereby releasing considerable amounts of virus into the saline portion. After infection, the blastodermal cells grew continuously while the embryonic development was markedly restricted. The saline virus amounts were about one log lower than the yolk virus. Growth of the 1-day egg-adapted

viruses was faster than their respective mother strains, especially in the case of COP (1-day egg-adapted CVS) and of FOP (1-day egg-adapted Flury); the peak titers were alike among them when compared on the ground that the baby mouse infective unit is an equivalent among all the strains, but in the case of COP virus its peak titers seemed to be slightly higher than those of its mother strain CVS.

"When adult-mouse-pathogenic virus (CVS or Flury) was given combinedly with non-pathogenic virus (HEP group), interference by the latter, as evidenced by the absence of adult-mouse-pathogenic virus in the saline of ERO, was observed depending on the ratio of inoculated virus amounts. Such an interference took place only when the HEP virus exceeded in amount the CVS or Flury virus; the CVS strain seemed to be more readily interfered with than was the Flury strain in the ERO system."

Viazhevich, V. K. **A Case of Birth of a Healthy Baby to a Mother during the Incubation Period of Rabies.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1022–3. [Translated from Russian.]

Gorshunova, L. P. **Experimental Studies on raising the Effectiveness of Anti-Rabies Vaccination.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 956–60. [Translated from Russian.]

"(1) Repeated (4 times) injection of anti-rabies vaccine with short intervals (30 min or 2 hr) both before and after infection with street rabies virus proved to be more effective than injection of the same amount of vaccine in one dose.

"(2) Fractional administration of vaccine over 5 days was more effective than the usual schedule over 10 days using twice the amount of vaccine.

"(3) Rapid vaccination (12 injections of vaccine over 24 hr) begun 2 hr after infection ensured the survival of a larger number of rats than a once-daily injection of vaccine over 12 days using 6 times the amount of vaccine in the course of immunization.

"(4) A comparison of the effectiveness of various vaccination schedules after preliminary injection of anti-rabies γ-globulin also proved the advantage of schedules based on the principle of the summation of immunization stimuli over micro-intervals of time."

Perlina, F. I. **On Nervous System Affections following Anti-Rabies Vaccination.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 960–63. [Translated from Russian.]

Selimov, M. A., Durasova, M. N., Rogozina, E. N., Ratgauz, V. G. & Maiorova, I. I. **Anti-Rabies γ-Globulin. I. Preparation and Fractionation of Rabies-Immune Serum.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 952–6. [Translated from Russian.]

"(1) Horses may be used for the production of large volumes of rabies antiserum.

"(2) Under the conditions of our scheme the horses stood up well to immunization with live fixed rabies virus.

"(3) Both the ammonium sulphate and the alcohol precipitation method appeared to be suitable for fractionating rabies antiserum. However, the latter method yielded a more standard and uniform purified preparation."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Wessman, G. E., Miller, Donna J. & Surgalla, M. J. **Toxic Effect of Glucose on Virulent *Pasteurella pestis* in Chemically Defined Media.** *J. Bacteriology.* 1958, Oct., v. 76, No. 4, 368–75, 4 figs. [12 refs.]

"Five virulent strains of *Pasteurella pestis* cultivated at 37°C in a chemically defined medium containing glucose as the energy source, underwent a reduction in viable count, then recovered and grew in a logarithmic manner. Two glycerol-fermenting virulent strains and seven avirulent strains produced normal growth curves. The reduction in count appeared to be caused by death and lysis of the cells. It was not apparent when other energy sources were used, and did not occur at temperatures below 37°C. The addition of relatively large amounts of Mn^{++} or Mg^{++} to the medium prevented or reduced the fall in viable count.

"When the organisms which grew after the culture had undergone a reduction in count were titrated for virulence at various stages of growth, they were found to become progressively less virulent, except when the initial pH was above 7·8. Cultures of the Alexander strain lost virulence for mice rapidly upon serial transfer in a synthetic medium containing glucose, but showed a markedly smaller shift in virulence if the energy source was xylose, galactose, or mannose."

Macchiavello, A. Estudios sobre peste selvática en América del Sur. IV. Transmisión experimental de la peste por *Polygenis litargus*. [**Studies on Sylvatic Plague in South America. IV. Experimental Transmission of Plague by** *Polygenis litargus*] *Bol. Oficina Sanitaria Panamericana.* 1958, Aug., v. 45, No. 2, 122–31. [18 refs.] English summary.

Laboratory studies are described dealing with the efficiency of the flea, *Polygenis* (*Rhopalopsyllus*) *litargus*, ectoparasite particularly of *Sigmodon peruanus* in Peru and Ecuador, as a plague vector. Transmission was obtained within 5 days of an infecting meal. Blocking occurs in this flea, usually 20 to 30 days after first infection. Blocked fleas die in about 4 to 6 days, but the blocked condition is not always permanent with ensuing fatality. It is said that, in nature, fleas may survive 6 months or more without food. Its natural host, *S. peruanus*, is highly susceptible to infection and infects fleas more successfully than *Rattus* or *Cavia* which develop less severe infections. The proportions of successful transmissions to these animals were, in one series of experiments, 11 out of 18 (*Sigmodon*), 6 out of 18 (*Cavia*) and 7 out of 19 (*Rattus*).

A severe enzootic in *S. peruanus* in the rural plague area of Trujillo remained restricted to this rodent during the cold months, the fleas tending to remain on the dead animals and in their burrows and nests. *Rattus r. frugivorus* was not involved to any great extent. It was only with the onset of summer that *R. r. frugivorus* and later *Rattus r. rattus* were involved. This is attributed to the increased activity of *Xenopsylla cheopis* on these rats during the warm season.

Different conditions appear to affect *P. litargus* in the frontier region of Peru and Ecuador where it is more frequently in the open in maize fields on hill-slopes, biting man readily, and responsible for cases of sylvatic plague.

[See also this *Bulletin*, 1958, v. 55, 33.] *D. S. Bertram*

Medinskii, G. M. & Razumeenko, T. V. **Allergy caused by Vaccination with Live Plague Vaccine.** [Authors' summary.] *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1054–5. [Translated from Russian.]

This paper is itself a summary. It records the appearance of swelling, redness and tenderness at the site of an intradermal inoculation of live plague vaccine, within 24 hours of the inoculation. The next day pain appeared in the elbow, shoulder and wrist and the day after, pain and swelling developed in the left kneejoint. Despite treatment with antibiotics in hospital, the patient became worse and developed severe joint pains, sleeplessness and anorexia. The temperature rose and the patient experienced difficulty in breathing. A pustule developed at the

injection site and the affected forearm was red and swollen. Axillary, inguinal and femoral glands became enlarged and painful. Fluid was aspirated from the swollen kneejoint. On the 7th day after the inoculation, the patient was very ill, with multiple joint pains. The antibiotics were discontinued and anti-allergy therapy undertaken (dimedrol, calcium chloride, sodium salicylate, glucose, ascorbic acid and copious fluids).

Improvement was rapid, symptoms began to disappear the next day, the temperature fell to normal, and eventually the joint manifestations cleared up. The patient was discharged in a satisfactory condition 3 weeks after the inoculation.

The authors considered that this was a severe allergic reaction to intradermal inoculation with live plague vaccine and that such a manifestation should be anticipated by those organizing mass inoculation.

H. J. O'D. Burke-Gaffney

Girard, G. & Grumbach, F. L'infection tuberculeuse de la Souris entraîne sa résistance à l'infection pesteuse expérimentale. [**Tuberculosis of the Mouse enhances its Resistance to Experimental Plague**] *C.R. Soc. Biol.* 1958, v. 152, No. 2, 280–82.

The senior author has already reported [this *Bulletin*, 1952, v. 49, 770] that leprous rats (Stefansky's bacillus) show a marked resistance to plague and that this is in accord with an old observation in Madagascar that persons with leprosy escape plague. In the plague epidemic of 1911 in Madagascar which claimed 50,000 victims autopsies revealed practically no lesions of pulmonary tuberculosis associated with pneumonic plague, which intrigued the local physicians who knew the great frequency of human tuberculosis in that territory, and in consequence of these observations experiments were carried out to ascertain if tuberculosis could act like leprosy in inhibiting plague.

White mice of a strain very susceptible to tuberculosis were used in the experiments, and the results indicated that mice infected with tuberculosis showed a degree of resistance to experimental plague which was more marked as the tuberculosis was more advanced. Tuberculosis was normally fatal to the mice and the plague infection had no effect on its course.

The authors could discover no explanation for these findings.

P. A. Clearkin

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Sarkar, J. K. **Survival of *V. cholerae* and other Intestinal Pathogens in Water.** *J. Indian Med. Ass.* 1958, Aug. 16, v. 31, No. 4, 154–6.

This work was planned to ascertain the viability of common intestinal pathogens in water from common sources of supply in Calcutta under laboratory conditions. Samples were obtained from the Hooghly river in Calcutta, a pond in Tollygunge, tap water of the Calcutta Corporation and a tube well. Distilled autoclaved water was added to the list. The samples were filtered through L_3 candles of the Pasteur-Chamberland type to remove organisms. Test organisms were *Escherichia coli*, *Salmonella typhi*, *Salm. paratyphi B*, *Shigella dysenteriae 1* (Shiga), *Sh. flexneri*, *Bact. alkaligenes*, *Vibrio cholerae* and non-agglutinating vibrios isolated from water.

E. coli, *Salm. paratyphi B* and *Bact. alkaligenes* survived in almost any water, including distilled water, up to 18 days; dysentery bacilli failed to survive in any type of water; water from the Hooghly river supported *V. cholerae* and non-agglutinating vibrios up to 20 days.

The *p*H of about 8·0, which the Hooghly river water maintains throughout the year and which is maintained by waters of ponds in West Bengal in summer [this *Bulletin*, 1955, v. 52, 153], seems to be most favourable to survival of *V. cholerae*. *P. A. Clearkin*

Felsenfeld, O. & Watanabe, U. Y. **An Alkaline Tellurite Lauryl Sulfate-Salt Plate for the Isolation of *Vibrio comma*.** *U.S. Armed Forces Med. J.* 1958, July, v. 9, No. 7, 975–82. [10 refs.]

Many media have been described for isolation of the cholera vibrio, some of which are difficult to prepare, others, like the Aronson plate, though excellent for growth of the vibrio are not sufficiently selective. The authors therefore investigated a number of inhibitory substances for addition to the basically excellent plating media to facilitate the primary isolation of cholera vibrios by the less experienced. A plating medium was finally evolved with the following composition: a commercial blood agar base (Difco or Baltimore Biological Laboratory) with 0·01% sodium lauryl sulphate, 0·1% tellurite blood solution (equivalent to 1:100,000 potassium tellurite), a final sodium chloride concentration of 2% and 1% sucrose at a *p*H of 9·6. This plate proved to be very selective after 24 hours' incubation; contaminating flora did not grow in 24 hours but became evident after 48 hours though vibrios could still be selected from the surface with ease.

The plate is not suggested as a sole medium for isolation of vibrios but

may be used together with plain alkaline agar and if possible Aronson's medium. It permits growth of El Tor vibrios, thus differing from the medium of Wilson and Reilly [this *Bulletin*, 1941, v. 38, 211] and though not superior to the Panja and Ghosh plate [*Bull. Hyg.*, 1944, v. 19, 385] it is much easier to prepare. Moreover the greyish colour of vibrio colonies facilitates their recognition.

[The figure for tellurite blood solution is as given in the authors' summary, but the tables suggest that it should be 0·2%.]

P. A. Clearkin

Watanabe, Y. **Phage absorbed on Paper Disks in the Rapid Identification of** *Vibrio comma*. *Amer. J. Trop. Med. & Hyg.* 1958, May, v. 7, No. 3, 312–14, 1 fig.

Certain phages are useful for identification of cholera vibrios but are difficult to maintain and rapidly lose their activity in media. Experiments were therefore designed to ascertain if phage could be maintained on paper disks for diagnostic use. Four phage lysates were selected for test because of their broad host range against cholera vibrio strains. The lysates were prepared by the aeration procedure of Adams. Filter paper and blotting paper of U.S. army stock were used after washing with ether. Disks 4 mm. in diameter were prepared, autoclaved and dried in the hot air oven. The disks were soaked in 1·0 ml. of each phage lysate in different dilutions, dried in a vacuum over calcium chloride overnight and stored in small serum flasks at 4·0°C. The lytic activity of the disks was determined immediately after preparation and re-checked at intervals of 4 weeks. No decrease in activity of the disks was noted after 4 months except in the case of one strain which showed a slight decrease.

The method was tested with over 100 strains of *V. cholerae* of different types. Individual disks produced differences in their zones, but excellent results were given with mixed phage absorbed on filter paper.

The following procedure is recommended for identification of *Vibrio cholerae*. (1) The organism suspected of being *V. cholerae* is grown overnight in an alkaline medium. (2) Of this growth, 0·1 ml. is mixed with 2·5 ml. semisolid agar and poured on top of solid agar in a Petri dish. (3) A filter-paper disk soaked with mixed phage lysate is dropped on the upper layer after solidification. (4) After incubation, preferably at 31°C. for 24 hours the plates are observed for lysis.

Filter paper pads should be prepared in a large laboratory which is equipped to manufacture and maintain them. *P. A. Clearkin*

Farkas-Himsley, Hannah. **Metabolic Studies of Streptomycin Sensitive, Resistant and Dependent** *Vibrio comma* **(type Ogawa).** *Bull. Res. Counc. of Israel.* 1957, Dec., v. 6E, No. 3, 8. [10 refs.]

Khundanov, L. E. & Azarginova, F. S. **Effectiveness of Individual Protein Fractions of Cholera Antiserum.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1049. [Translated from Russian.]

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Cabrera, H. A. & Porter, R. J. **Survival Time and Critical Temperatures of Various Strains of** *Entamoeba histolytica*. *Exper. Parasit.* New York. 1958, May, v. 7, No. 3, 285–91, 1 fig.

6 strains of *Entamoeba histolytica* of different origin and with various bacterial floras, as well as one strain of *E. coli*, were used in experiments to ascertain their survival time in cultures kept at temperatures from 3°C. to 45°C. In the case of cultures grown at lower temperatures, the survival time was tested by incubating, at 37°C. at intervals of 24 hours, one tube from a set grown at a given temperature, and, in the case of those grown at higher temperatures, by immediate examination and subculture. The mean survival time of *E. histolytica* strains varied as follows (in days): 3°C. 2–4, 18°C. 2–4·3, 25°C. 2–5, 32°C. 3–11·3, 37°C. 3·7–9·7, 41°C. 4–8·7, 45°C. 1–3·5 hours. On the other hand, *E. coli* was more susceptible to low temperatures and more resistant to high ones. Interchanging the bacterial flora had no significant effect on the survival time of different strains.

In another set of experiments the critical temperatures were determined for 3 strains of *E. histolytica* and one of *E. coli*. At 33°C. all the strains grew as well as at 37°C.; at 32°C. *E. coli* failed to establish itself, while *E. histolytica* required several transfers before it adapted itself to this temperature. However, lowering the temperature by less than 0·5° below 32°C. resulted in the death of most of the strains. The high critical temperature for all strains of both species was 40–41°C., at which they were maintained for one month. The critical temperatures for different strains were not affected by interchanging their flora. It is concluded that temperature adaptation is an intrinsic property of the amoebae themselves.

C. A. Hoare

Cabrera, H. A. **Temperature Adaptation of** *Entamoeba histolytica* **and its Effect on Virulence.** *Exper. Parasit.* New York. 1958, May, v. 7. No. 3, 276–84, 2 figs. [14 refs.]

Cultures of three strains of *Entamoeba histolytica* were adapted to growth at temperatures below and above 37°C. Adaptation to 29°C. and 42°C. was reached by gradual lowering of the temperature by 0·5° and raising it by 0·3° every two weeks respectively. Some strains adapted to high and low temperature produced large crops of cysts when returned to 37°C. When grown at this temperature two strains had a low degree of virulence, as assessed by the production of only one liver abscess in 15 hamsters inoculated intrahepatically. But, after adaptation to 30°C., the virulence of these strains increased and they produced liver abscesses in the majority of the hamsters. However, in one of the strains this virulence was lost and the original low-grade pathogenicity was restored by cultivation at 37°C. The role of bacteria in enhancing the virulence of a strain was demonstrated by adding the bacteria from the adapted strain to the control strain; this transfer increased the virulence of the control, which produced a moderate number of amoebic abscesses in inoculated hamsters. *C. A. Hoare*

Geekie, H. A. W., Freedman, L. & Elsdon-Dew, R. **Cyst Formation *in vitro* by *Entamoeba histolytica*.** *Proc. Soc. Exper. Biol. & Med.* 1958, June, v. 98, No. 2, 286–7.

The authors have studied factors favouring cyst formation in strains of *Entamoeba histolytica* isolated in culture from cases of liver abscess [this *Bulletin*, 1958, v. 55, 1327]. When grown with *Clostridium welchii* or *Escherichia coli* the amoebae never encysted, but cysts were regularly produced with complex "M.", representing the faecal flora of another strain of amoebae and consisting of 6 bacteria, characterized as follows: *a*, *b*—coliform, *c*—Gram negative anaerobic bacillus, *d*, *e*—Gram positive aerobic bacilli, *f*—streptococcus. In order to determine which of these bacteria promoted cyst formation, they were added in various combinations to *E. histolytica* grown in two lines with *C. welchii* or *E. coli*. The results are shown in tabular form, from which it is seen that in one line of amoebae, *c* was essential for encystation though alone it was ineffective; on the other hand, *f* appeared to inhibit cyst formation. The other line of amoebae responded similarly but additional combinations of 5 organisms also induced encystation. The results indicated strain differences. *C. A. Hoare*

Heinz, H. J., MacNab, G. M. & Freeman, F. **The Role of the Bone Marrow in Antibody Production in Amoebiasis.** *South African J. Med. Sci.* 1958, Apr., v. 23, No. 1, 13–16.

The complement-fixation test is often negative in intestinal amoebiasis and may be so in extra-intestinal infections. The authors examined sera

from human cases and samples of sera and of bone marrow from rabbits infected with amoebae (from the 7–16th days after infection). Tests were carried out with the micro-Kolmer technique and the use of sonically prepared antigen.

In 17 rabbits it was found that the antibody response was greater in the marrow preparations than in peripheral blood serum taken at the same time.

In 1 human case of amoebic liver abscess in which the pus contained amoebae, the complement-fixation test was persistently negative in the blood, whereas tests were positive in bone-marrow preparations. In 16 cases of hepatitis " suggestive of an amoebic infection " the test was positive with serum and became negative 3 to 6 weeks after emetine treatment. 5 showed positive marrow tests when the blood had become negative.

Electrophoretic studies were made on the proteins of the blood and bone-marrow of 30 rabbits before, one, and two weeks after, infection with amoebae. In the infected animals there was a fall in albumin and a rise in globulins, including gamma globulin in both serum and marrow, the changes being slightly greater in the latter.

The authors suggest that complement-fixation tests on the bone-marrow may help in suspected amoebic infections in which the serum reaction is persistently negative. *B. G. Maegraith*

Basnuevo, J. G. & Figares, E. La solucion F2AM y el raspado de la mucosa rectal en el diagnóstico de la amibiasis. [**The F2AM Solution and the Scraping of the Rectal Mucosa in the Diagnosis of Amoebiasis**] *Rev. Kuba Med. Trop. y Parasit.* 1957, July–Dec., v. 13, Nos. 7/12, 60–67, 2 figs. [10 refs.] English summary.

The authors believed that the examination of scrapings of the rectal mucosa, obtained by proctoscopy, affords the surest method for the diagnosis of amoebiasis. In the present paper they recommend the use of F2AM solution for the preservation of the amoebae in this material. This solution, the composition of which is described in another paper [below], acts both as fixative and stain, revealing the nuclear structure of both trophozoites and cysts of *Entamoeba histolytica* (as well as of other intestinal protozoa), as shown in the figures accompanying the paper. The parasites preserved in F2AM can also be concentrated by centrifugation. Finally, permanent preparations can be made by fixing smears of the preserved material in Schaudinn's fluid and staining them with iron haematoxylin.

The examination of scrapings from 100 patients preserved by this method revealed the presence of *E. histolytica* in 28 cases, only 12 of which showed the amoebae in faecal preparations. The history of the positive cases is described in detail. *C. A. Hoare*

Basnuevo, J. G. & Figares, E. La solucion F2AM para la conservacion de trofozoitos y quistes de *Endamoeba histolytica*. [**The F2AM Solution for the Conservation of Trophozoites and Cysts of** *Entamoeba histolytica*] *Rev. Kuba Med. Trop. y Parasit.* 1957, July–Dec., v. 13, Nos. 7/12, 85–7.

A description is given of a new solution (F2AM) for the preservation of *Entamoeba histolytica*. The stock solution consists of 2 gm. methylene blue, 40 cc. of 95% alcohol, 8 cc. of carbolic acid, 40 cc. of water and 10 cc. of 40% formol. For use, 1 cc. of the stock solution is mixed with 0·1 cc. carbolic acid, 89 cc. water and 10 cc. formol. Both solutions can be kept without deterioration for about 5 years. To 10 cc. of the second solution in a centrifuge tube is added 1 gm. of fresh faeces; the mixture is centrifuged and a drop of the sediment is removed for microscopical examination. For identification of the amoebae and cysts, 1% eosin or Lugol's solution can be added to the preparation. In F2AM the parasites are preserved for about 2 months. Scrapings of the rectal mucosa, obtained by proctoscopy, are treated in the same manner, but only 3 cc. of the preservative are used. *C. A. Hoare*

Jarpa, A. & Donckaster, R. Estudio comparativo de las características de la mucosa rectosigmoidea en individuos con y sin infección amibiana. [**Comparative Studies of the Appearance in the Rectosigmoid Mucosa in Persons with and without Amoebic Infection**] *Rev. Med. Chile*. 1958, Apr., v. 86, No. 4, 233–8. [24 refs.]

Amoebiasis is an important problem in Chile where some 17% of the population are infected.

The authors, from the University of Chile in Santiago, discuss the difficulties of diagnosis in symptomless amoebiasis and the pathological lesions in the rectosigmoidal mucosa which are claimed to be specific. In view of the differences of opinion on this matter, they made a comparative study in persons with and without *E. histolytica* infection.

Rectoscopic examinations were made in 566 patients who were divided into 4 groups, namely (A) those with *E. histolytica* only, (B) those with other intestinal parasites also, (C) those with parasites other than *E. histolytica* only and (D) those with no parasites. In all 396 (71%) harboured *E. histolytica* and 170 (29%) did not. Those infected were mostly without symptoms.

The characters studied were hyperaemia, opacity [*delustramiento*] of the mucosa, oedema and the presence of punctiform craters. The results are shown in tables, in degrees of severity, for each of the 4 groups of patients. These results show clearly that the characters studied were equally frequent in those infected and not infected with *E. histolytica*. It was only in those with acute symptoms that any typical changes were found.

The authors conclude from these results that examination of the rectosigmoidal mucosa is of no value in the diagnosis of chronic or symptomless amoebiasis, since the changes found are non-specific.

H. J. O'D. Burke-Gaffney

Sachdev, S. & Dhupar, H. L. **Clinical Trial with 11925 in Amoebiasis.** *J. Indian Med. Ass.* 1958, Sept. 1, v. 31, No. 5, 198–202.

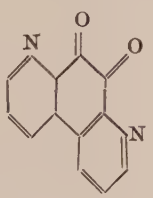
27 patients suffering from parasitologically proven acute amoebic dysentery were treated with Ciba 11925. The dosage for adults was 0·2 gm. (2 tablets) thrice daily for 10 days; 3 stools were subsequently examined 1, 2, 4 and 6 months after the end of treatment, and a sigmoidoscopic examination also was done.

Data relative to the individual patients are set out in a table. From a study of this it seems that the immediate response to treatment was good in all but 2 patients. In one of these malaria was a complication and haematuria and urinary suppression followed the first dose of the drug; in the other no benefits from the treatment were discernible within a week, and the patient then left. In the follow-up it is stated that only 4 patients had continuing infections. Side-effects from the treatment were negligible.

A. R. D. Adams

Nagaty, H. F., Rifaat, M. A., Salem, S. & Khalil, H. M. **Clinical Trials of Compound 11925C. A New Amebicidal Drug.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 416–18.

This drug, 11925C or Entobex (Ciba), is 5,6-quinone, 4,7-phenanthroline with the following structural formula:—



It is slightly soluble in water and is excreted in the bile and urine. The makers claim complete eradication of *Entamoeba histolytica* infection in rats by the fifth day on a daily dose of 50 mgm./kgm. of body weight. The drug is bacteriostatic against both Gram-negative and Gram-positive organisms.

24 patients, ranging in age from 1 to 60 years, with numerous *E. histolytica* in the stools, were treated with 11925C; 15 suffered from acute amoebic dysentery, 5 had a history of it and 2 of these had evidence

suggestive of liver involvement, yet a further patient had tenderness over the liver area, and the remaining 3 were symptomless.

The drug was given orally for 7 days in daily doses of 4 to 5·5 mgm./kgm., or 5·6 to 8 mgm./kgm., or 8·1 to 12·5 mgm./kgm. Stools were re-examined on the third, seventh, fifteenth and twenty-first days after treatment was begun. In 23 of the 24 patients, according to a table, stools were still negative 3 weeks after the start of treatment.

The authors reach the following conclusions:—

"1) The drug was effective in the three dosages used; the smaller doses required a longer treatment for clearing the infection.

"2) Best results were obtained using 8·1 to 12·5 mg/kg of body weight daily, clearance of infection being obtained in eight cases of nine on the third day and in all on the seventh day.

"3) The drug seems to be ineffective in treating amebic hepatitis.

"4) The drug failed to cure *Giardia* or *Trichomonas* infections.

"5) No toxic symptoms appeared apart from mild diarrhea in two patients after the fourth day of starting treatment. One of these was cured spontaneously and the other by administration of sulphaguanidine."

A. R. D. Adams

Sagone, M. Action d'un nouvel amoebicide synthétique sur certains types de parasitose intestinale. [**Action of a New Synthetic Amoebicide on Certain Types of Intestinal Parasites**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 642–7.

The drug is 11925C or Entobex (Ciba) [see above]. 720 patients in Somalia, with microscopically proven *Entamoeba histolytica* infections, were treated [orally] for 8 days; the course was repeated after 3 or 4 months. After increasing doses for 3 days an average of 30 mgm. was given daily in 3 fractionate doses for another 5 days. 685 (95·2%) of the 720 patients passed stools free from these parasites at the end of the course of treatment; 35 (4·8%) were not then stool negative. In the majority of cases symptoms and signs rapidly cleared during the treatment. After 3 months 216 (30·0%) were stool positive. Comparison with the results of treatment of 1,000 patients with emetine hydrochloride showed 715 (71·5%) of these latter to be stool negative on the completion of treatment, and 301 (30·1%) to be stool positive after 3 months. The author, nevertheless, considers 11925C to be more effective than emetine, well tolerated, and a better amoebicide than many now in use. He also found it encouraging in the treatment of other intestinal protozoal infections.

[In the abstracter's opinion it seems obvious that the stool findings immediately on the completion of a course of treatment should never be used as a gauge of the value of a drug for the eradication of the infection. Any contact amoebicide may render the stools *temporarily* negative.]

A. R. D. Adams

Banerjee, B. N. **Assessment of Efficacy of a 'New Synthetic Anti-amoebic Compound' in Amoebiasis associated with Skin Diseases.** *Indian J. Dermat.* 1958, July, v. 3, No. 4, 143–5.

Amoebiasis is stated [categorically] to be a factor of importance in the management of patients suffering from skin diseases such as leucoderma, internal toxic dermatitis, intractable urticaria and pruritus. Its eradication is therefore of interest to the dermatologist. The Ciba preparations 11925 or 11925C were tried in the treatment of acute or chronic amoebiasis in 74 patients; 11925 was thought to be the more satisfactory of the two; toxic side-effects, which were slight, vanished on reduction of the dosage. [The data appended do not warrant clear conclusions on the efficacy of either drug.] *A. R. D. Adams*

Amaral, A. D. F. & Pires, C. D. de A. Ação da dicloroacetamida sôbre a *Entamoeba histolytica*. [**Action of Dichloroacetamide on** *E. histolytica*] Reprinted from *Rev. Med. e Cirurg. S. Paulo.* 1958, Apr., v. 18, No. 4, 15 pp. English summary.

The authors, from São Paulo, Brazil, refer briefly to the literature on the use of different therapeutic agents in the treatment of amoebiasis.

They then describe trials with beta-oxy-ethyl-paraphenol-oxy-nitro-benzyl-dichloracetamide (Mebinol) in 10 prisoners who were "oligosymptomatic cases of amebiasis". They were chosen from 34 persons positive for *E. histolytica* out of 100 whose stools were examined. Many of these persons carried multiple parasites: details of all are listed. The stools of the 10 patients were examined on various occasions before and after treatment by Faust's method and that of Hoffman, Pons and Janer and then purged stools were examined by staining with iron haematoxylin. The authors have found this scheme very reliable for detecting *E. histolytica*.

Each of the 10 patients received 500 mgm. of Mebinol 3 times daily for 10 days. The amoebae disappeared within 3 to 10 days in every case and were absent in control examination carried out on 2 or 3 occasions up to a period of 7 months. It is stated that the drug was well tolerated.

[See also this *Bulletin*, 1958, v. 55, 1329.]

H. J. O'D. Burke-Gaffney

Josephine, M. Ann (Sister). **Experimental Studies on** *Entamoeba histolytica* **in Kittens.** *Amer. J. Trop. Med. & Hyg.* 1958, Mar., v. 7, No. 2, 158–64, 1 fig.

In order to determine the factors responsible for the acute form of disease in kittens infected experimentally with *Entamoeba histolytica*, newly weaned animals, shown to be free of intestinal parasites, were divided into 2 groups, represented by litter mates. In one the kittens

were fed on canned food and kept in separate cages, in the other the diet was supplemented with meat and milk, and the kittens were kept in a large outdoor cage, while controls were placed in separate cages. The experimental animals were inoculated intracaecally with 5 ml. of cultures containing about 2–4 million amoebae, while controls received similar amounts of bacteria. The animals were killed at different intervals after infection and the presence of amoebae and lesions was recorded at autopsy. At the same time blood was taken for complement-fixation tests and electrophoretic analysis.

The results for the 2 groups (comprising 48 and 20 animals, respectively) were as follows:

	Group I	*Group II*
Amoeba recovered	26 (60%)	12 (60%)
Macroscopic lesions found	21 (49%)	4 (20%)
Suggestive lesions present	8 (19%)	4 (20%)
No macroscopic lesions seen	14 (32%)	12 (60%)

In addition, in 6 kittens which later developed coccidiosis, inoculation of *E. histolytica* produced macroscopic ulceration in 5.

The lower incidence and milder form of the infection in the second group are attributed to better nutrition, opportunity for normal exercise or association with other animals, of which the first group was deprived. The author suggests that the severity of amoebiasis in kittens is probably not due to the parasite itself, but is influenced by individual variations in the host's susceptibility, its state of nutrition, intercurrent infection (*e.g.* coccidiosis), and its psycho-physical response to stress. *C. A. Hoare*

Lippi, M. & Mastrandrea, G. La lambliasi (o giardiasi) umana. [**Giardiasis in Man**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, June, v. 39, No. 6, 339–99, 4 figs. [Numerous refs.]

A general account and considerable review of literature.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Geigy, R. & Sarasin, G. Isolatstämme von *Borrelia duttoni* und ihr Immunisierungsverhalten gegenüber der weissen Maus. [**The Isolation of Strains of *Borrelia duttoni* and their Immunological Relationships in White Mice**] *Acta Tropica.* Basle. 1958, v. 15, No. 3, 254–8. [10 refs.]

The authors used strains of spirochaetes obtained from single organisms isolated by the use of Lederberg's method for the isolation of bacteria. Such single-cell strains were isolated from human cases of relapsing fever

at Ifakara, and from ticks at Itete and Kiswago, respectively, all localities in south Tanganyika. Mice were infected not only with the single-cell strains but also with the three original strains from which they had been isolated. They showed an incubation period of 3 to 6 days—usually 5 days—and generally three attacks, on the 6th, 10th and 16th day of infection. No marked difference was observed in the course of the infections. Cross-immunity tests were then made with mice which had been twice inoculated with the same strain, the second time about 60 days after recovery from the first inoculation. A few of these mice showed a second infection. Those which remained negative were then inoculated with other single-cell strains of the same origin, single-cell strains of different origin, and also the general (mixed) strains from which the single-cell strains had been isolated. A high degree of immunity was shown in the majority of the animals and only a few isolated cases of reinfection were observed. Emulsions of the brains of mice that had been infected 60 days previously were inoculated into both normal mice and mice immunized against the various strains. Residual brain infections invariably developed in the normal mice but the immunized animals remained negative, except for a few cases in which a very slight, almost inapparent, infection resulted. *Edward Hindle*

YAWS AND OTHER TREPONEMATOSES

Mikol, C. & Solente, G. Réaction universelle de Kahn et pian. [**Kahn's Universal Reaction and Yaws**] *C.R. Soc. Biol.* 1958, v. 52, No. 2, 319–20.

The following is a translation of the authors' summary:—

The reactional pattern demonstrated by Kahn in yaws has not been confirmed. The few differences found between the sera of yaws and syphilis, admittedly at a late stage of these infections, do not invalidate the antigenic identity of the two treponemes responsible for the two diseases. They may be easily explained, without doubt, by the complexity and the antigenic multiplicity of the antigen used or even more by the additional and non-specific modifications of the sera, perhaps in relation to a different serological background or one modified by some previous pathological condition. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Blanc, M. Étude du *Mycobacterium marianum.* [**Study of** *Mycobacterium marianum*] *Maroc. Méd.* 1958, June, v. 37, No. 397, 650–67. [66 refs.]

This article is an extensive review of the literature of this bacillus; it includes its history, its cultural characteristics and the effects of injecting it, alive and heat-killed, into animals. A large proportion of the review is devoted to the effects of its use in man, in whom it was injected intradermally at intervals ranging from 30–45 days as either a heat-killed suspension or as a similarly killed fluid culture.

The fact that the bacillus is now generally accepted as not the causal organism of leprosy is emphasized, but as an agent for changing the lepromin status it is claimed to be superior to BCG. In an apparently uncontrolled series of contacts and patients suffering from the various forms of leprosy, conversion to the lepromin-positive state occurred in a large proportion after the injections of the antigens, *e.g.*, of 119 lepromatous patients, of whom 12 were lepromin-positive and 107 negative before the injections, 1 of the positive reactors became negative and 81 of the negative reactors became positive. Also, in children at 3 schools in Africa, the incidence of leprosy since the introduction of this immunization in 1950, has fallen from 6–8·7% to 0·54–2·1% at the 3 schools.

These antigens are also claimed to be of therapeutic value as an alternative treatment when the sulphones alone are ineffective or when these drugs cannot be given because of their toxic effects.

S. R. M. Bushby

Hilson, G. R. F. & Elek, S. D. **Intratesticular Multiplication of** *Mycobacterium leprae murium* **in Normal and Suramin-Treated Animals.** *Internat. J. Leprosy.* New Orleans. 1957, Oct.–Dec., v. 25, No. 4, Pt. 1, 380–91, 3 figs.

From the results of experiments described in a previous paper [this *Bulletin*, 1957, v. 54, 447] the authors concluded that during the first 6 weeks after intraperitoneal injection into rats, *Mycobacterium leprae-murium* divided little, if at all, although they increased in length. The present work was an attempt to confirm these findings by more precise techniques and to determine the effects of suramin on murine leprosy.

Under general anaesthesia, mice and rats were inoculated intratesticularly by means of a micrometer syringe with 0·01 ml. and 0·02 ml., respectively, of bacillary suspension. Immediately after and at intervals up to 4 months after the injection, batches of 6–8 of the animals were

killed and the number of bacilli present in the testes counted. The technique used is described in detail but essentially it consisted of homogenizing the organ, spreading a constant volume of the homogenate over a fixed area of a slide and then counting the number of bacilli per field; statistical analysis showed that an increase of 50% was significant. One testis of each animal was examined histologically but before fixation an impression smear was made and the length of the bacilli measured with a micrometer eye-piece.

In an experiment with 148 mice, in which the inoculum was 6 million bacilli, an early reduction in the number of bacilli was observed, and this was followed by an increase, which was slow during the first 5 weeks but then became logarithmic; mice injected with boiled bacilli showed the same preliminary drop in number. Some of the mice were treated twice weekly with 1 mgm. suramin injected subcutaneously, and in these animals the multiplication was more rapid, the number of bacilli present by the 50th day being twice as large as in the control animals. Histological examination showed that the bacilli were taken up by mononuclear cells: there was at first 1–3 bacilli per cell but the number per cell increased during the first 2 months. That the bacilli increased in length was shown by 93% of those of the original inoculum being 1–3μ, whereas 1 month later 25% of the bacilli were longer than 3μ, 10% being 4·5μ or more in length; when multiplication in the logarithmic phase was well established, however, the bacilli again became shorter. The killed bacilli showed no change in length, indicating that the changes in length were not due to loss of the smaller bacilli from the testes.

Two experiments were made in rats, performed to see whether suramin, given subcutaneously 5 mgm. twice weekly in the first and 5 mgm., followed 4 days later by 2·5 mgm. each week in the second, would enhance the infection, as it did in mice, or retard multiplication. The infecting inocula in these rats was from rat leproma in the first and infected testes in the second, and the lag phases in multiplication of the bacilli seen in the mice were either much shorter or were absent in these rats. The mean generation time in rats was 7–8 days during the logarithmic phase as compared with 10 days in the mice and the suramin had no significant effect.

The absence of lag phase in the rat may be due to younger leproma and infected testes being used, and hence the bacilli were still in the logarithmic phase when transferred to the rats' testes, and to their being transferred to a similar host environment. The difference in the effects of suramin indicates that they are governed mainly by the reactions of the host, varying from one species to another, rather than a direct action on the organisms. *S. R. M. Bushby*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes *(schistosomes, other flukes);* Cestodes *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* Nematodes *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

Sotolongo Guerra, F. Progresos de la helmintologia en Cuba en los ultimos cincuenta años. [**Progress of Helminthology in Cuba in the Last 50 Years**] *Archivos Hospital Universitario.* 1958, May–June, v. 10, No. 3, 201–13. English summary (6 lines).

Jiménez-Quirós, O., Brenes, R. R. & Vieto, P. L. Parasitosis intestinal en el universitario costarricense. I. Helmintiasis. [**Intestinal Parasitic Infection in the University of Costa Rica. I. Helminths**] *Rev. Biologia Trop.* San José, Costa Rica. 1958, July, v. 6, No. 1, 113–22. [14 refs.]

The English summary appended to the paper is as follows:—

"The incidence and symptomatology of intestinal helminth parasites were investigated in 1000 male and 1000 female students entering the University of Costa Rica, aged 17 to 20 years. The over-all incidence of helminths was of 41 per cent. The most frequent parasite was *Trichuris trichiura* (33% in men, 31·4% in women), followed by *Ascaris lumbricoides* (5·8% in men, 7% in women), *Ancylostoma-Necator* (5·8% in men, 1·2% in women). There were also found *Strongyloides stercoralis* (1·6% in men, 0·6% in women), *Enterobius vermicularis* (2 cases, in females), *Hymenolepis nana* (1·6% in men, 1·4% in women) and *Taenia* spp. (0·6% in men, 1·0% in women).

"Helminthiasis symptoms in young adults have been little investigated. It is therefore interesting to note the occurrence among these students of headaches, smarting of the conjunctiva, and dysmenorrhea as the most frequent manifestations. Gastro-intestinal, hepatic, nervous, and allergic symptoms were also observed.

"*Trichuris trichiura* the most frequent nematode, causes also the highest incidence of symptoms, specially in females.

"Further studies are desirable to determine whether certain frequent disorders, such as headaches, conjunctival smarting, and dysmenorrhea should be investigated primarily as of helminthic origin, and especially as probable symptoms of *Trichuris trichiura.*"

Webbe, G. & Msangi, A. S. **Observations on Three Species of *Bulinus* on the East Coast of Africa.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 302–14, 3 figs. [21 refs.]

One of the most important gaps in our knowledge of the intermediate hosts of *Schistosoma* is a careful study of population fluctuations throughout

the year. This gap has been partially filled by Webbe and Msangi, who have carried out weekly observations on selected localities in Tanganyika populated by three species of *Bulinus*, all belonging to the subgenus *Physopsis*. The species concerned are *B. nasutus*, *B. globosus* and *B. africanus ovoideus*. The numbers of snails were estimated both by hand-collecting for fixed periods and by means of traps made of bamboo canes. The relative merits of these two techniques are discussed. Observations on size-composition of the samples, egg-laying and cercarial shedding are recorded and related to climatic conditions. The shedding of " mammalian type " cercariae from *B. nasutus* only 21 days after the refilling of a pond which had been dry for 5 months is recorded and the suggestion is put forward that these cercariae were produced by immature infections which had survived the aestivation of the snails.

C. A. Wright

El Azzawi, J. A. H. & Klimt, C. R. **Bilharzia Skin Test Trials in Iraq.** *Bull. Endem. Dis.* Baghdad. 1958, Jan., v. 2, Nos. 3/4, 100–16, 1 chart.

Schistosome skin testing trials were conducted in Iraq during 1957 under the joint responsibility of the Ministry of Health, Directorate of Endemic Diseases and the World Health Organization's Bilharzia Control Project in Iraq.

Attempts were made to standardize reading procedures, to assess the importance of false negative reactions in those with schistosomiasis, and false positive reactions in those without schistosomiasis, and to determine their causes.

Antigen, prepared from *Schistosoma mansoni* cercariae and obtained from naturally infected snails by Dr. W. Alves of Southern Rhodesia, was used with a control of a phenolized normal saline solution. A second antigen, prepared from infected livers of *Australorbis glabratus* by Dr. O. D. Standen of the Wellcome Laboratories of Tropical Medicine, England, and a control prepared in an identical manner from uninfected snail livers, were received in time for a negative control trial only.

The antigen prepared from *S. mansoni* cercariae was tested in 315 *S. haematobium* patients, with 9·2% false negative reactions, 20·0% intermediate and 70·8% marked positive reactions. In 500 persons free from *S. haematobium* infection, it gave 26·2% negative, 17·8% intermediate and 56·0% false positive reactions.

The skin test reactions in the negative control trial were related to the presence or absence of helminth ova and compared with the reactions to the skin test in the schistosome positive trial. It was possible to distinguish a schistosome positive group (9·2% negative, 70·8% positive), a group with intestinal helminthiasis (18·8% negative, 64·8% positive), and a group which is free of schistosomes and of intestinal helminths (60·4% negative, 17·6% positive).

Stronger reactions occur in older persons (over 20) than in those of 5 to 19 years of age, both in those infected with *S. haematobium* and in those infected with other intestinal helminths, but not in those free from either infection.

Sex does not appear to influence the skin reaction.

The antigen made from *S. mansoni* cercariae (although false negative reactions are low) therefore gives a high proportion of false positive reactions in a schistosome negative group. The false positive reactions are significantly related to intestinal helminths, particularly to *Ascaris lumbricoides* and also to *Enterobius vermicularis*, *Trichuris trichiura* and *Hymenolepis nana*.

The second antigen prepared from snail livers of *Australorbis glabratus* infected with *S. mansoni* was tested in 500 persons free from schistosomiasis.

The control extract prepared from uninfected snail livers gave a strong reaction, and 73·8% could not be classified as either positive or negative, 13·4% gave negative reactions and 12·8% false positive reactions.

W. E. Kershaw

Kenawy, M. R. & El-Mawla, N. G. **Study of the Bone Marrow and Blood in Bilharzial Cirrhosis of the Liver before and after Splenectomy.** *J. Egyptian Med. Ass.* 1958, v. 41, No. 2, 85–92. [20 refs.]

20 Egyptian male patients aged 20 to 30 years were diagnosed as having liver cirrhosis and splenomegaly of schistosomal origin. All were infected with *S. mansoni* and 3 were infected also with *S. haematobium*. The livers were firm and presented 2–3 fingers' breadth below the costal margin. The spleens were enlarged towards the umbilicus for 3–6 fingers' breadth. There was no ascites and no collateral venous engorgement. None of the patients showed signs of avitaminosis.

In all cases the following procedures were carried out: in the peripheral blood—erythrocyte, reticulocyte and leucocyte counts, and estimation of mean red cell diameter and haematocrit; in the serum—icterus index, Van den Bergh reaction, total protein content and albumin/globulin (A/G) ratio, and bilirubin concentration; also liver function tests were done, including Takata Ara and thymol turbidity; sternal marrow smears were examined; urine and stools were examined daily; a fractional test meal was given.

The patients were then subjected to splenectomy and after operation daily estimations were made of haemoglobin concentration, erythrocyte and white cell counts, etc. Sternal marrow was examined weekly over 2 months.

Before splenectomy, 18 patients had anaemia, with haemoglobin concentration ranging from 50 to 70%, and erythrocyte counts of 3 to 4

million cells per cu. mm. The colour index was less than 1·0. Erythrocyte size was normal except in 5 patients with hookworm infection, in which the cells were small. Reticulocytes were present in normal numbers except in one case (12%). The leucocyte count ranged from 2,000 to 4,000 cells per cu. mm. There was leuco-erythroblastic (macronormoblastic) hyperplasia of the bone marrow. Takata Ara and thymol turbidity tests were positive in all patients. The total protein ranged from 5·75 to 6·5 gm.%. The A/G ratio was reversed.

After splenectomy there was a gradual rise in erythrocyte count and haemoglobin concentration. Reticulocytes increased. There was some macrocytosis, the mean corpuscular diameter varying from 8·5 to 10·5 μ. The colour index remained below 1·0. The leucocyte counts increased. The marrow showed some reduction in cellular elements.

The removal of the spleen thus led to improvement in the blood picture associated with some macrocytosis. The authors suggest that the spleen may have released into the blood stream an inhibitory factor which caused " retention of the cells within the bone marrow ". They point out that the anaemia in their patients before treatment was not of the hyperchromic type seen in other forms of liver cirrhosis.

They intend in a further investigation to study the effects of the administration of vitamin B12 and folic acid on the blood picture after splenectomy. *B. G. Macgraith*

Ata, A. H. & Abd El Razzak, M. **Statistical Study of Hypertension in Bilharzial Cirrhosis.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 2, 163–7, 2 graphs.

It has been a general observation that low blood pressure rather than hypertension is a feature of liver disease. 508 Egyptian patients with proven schistosomal liver cirrhosis, in hospital for over 3 years, were the subjects of this study; 433 of these were males and 75 females; their ages ranged from under 10 years (5) to over 60 years (3). 30 males and 3 females (6·5%) of these patients had hypertension; in 17 (3·3%) of them the hypertension was of renal origin, and in 16 (3·2%) it was an essential hypertension. 14 of the 33 patients had ascites; only 4 of these ascitic patients belonged to the non-renal group. Some studies on 798 Egyptian labourers showed 24·4% of them to suffer from hypertension; other investigators in various parts of the world have reported higher figures of incidence in patients over 40 years of age. It therefore does seem that in patients with liver cirrhosis a high blood pressure is less frequent than in control samples of the population within the same age-groups.

The higher ratio of renal hypertension as opposed to that of the essential type (17:16) in the series immediately under study, in contrast to the more usual ratio of 8·4:100 in controls, is doubtless due to the

tendency of schistosomiasis to affect the urinary tract and cause pyelonephritis. Essential hypertension depends on adequate liver function for its maintenance, and cirrhosis of the liver reduces the latter. Renal hypertension is not reduced by reduction in liver function; thus in cases of renal hypertension there may be a shrunken liver, but this is rarely associated with essential hypertension. Possibly hypertensinogen or renin substrate concentrations fall with increasing liver cirrhosis and so prevent the development of hypertension, or reduce it if already evident. Alternatively, vasodepressor material is not destroyed by liver disease, and so there is a reduction in blood pressure.

Tables and block graphs supply data as to the age and sex incidence of the patients, and display the relevant findings on examination.

A. R. D. Adams

NELSON, G. S. *Schistosoma mansoni* **Infection in the West Nile District of Uganda. Part I. The Incidence of** *S. mansoni* **Infection.** *East African Med. J.* 1958, June, v. 35, No. 6, 311–19, 1 map. [33 refs.]

"This is the first of a series of papers dealing with schistosomiasis in the West Nile District of Uganda.

"*S. mansoni* was first reported from this area in 1923 but in 1950 when the author was posted to West Nile there were no data available for assessing the importance of schistosomiasis as a disease problem. It was decided to carry out a survey to determine the incidence, distribution and clinical significance of *S. mansoni*.

"*S. haematobium* is believed to be absent from the area; 2,000 urines from school children were all negative.

"The examination of 7,064 faecal smears for *S. mansoni* in 34 localities gave an overall incidence of 11·3%. The technique used in the survey seriously underestimated the real incidence. To assess the probable error 394 persons were examined using three techniques.

"The 'probable minimum incidence' of *S. mansoni* infection in West Nile is believed to be 31%.

"A study of age and sex incidence in 1,651 persons in the Nile valley and 3,327 persons in the Western Uplands showed a generally higher infection rate in males.

"Under the age of 3 years only 2 out of 320 children examined were found infected.

"The highest incidence was in the age group 5–15 years. This is the usual finding in all schistosomiasis areas and the decline in infection rates in adults is even more marked with *S. japonicum*, *S. haematobium* and *S. intercalatum*. An immunity process would appear to prevent superinfection.

"Part II of this series will deal with the distribution of *S. mansoni* in West Nile."

Nelson, G. S. *Schistosoma mansoni* **Infection in the West Nile District of Uganda. Part II. The Distribution of** *S. mansoni* **with a Note on the Probable Vectors.** *East African Med. J.* 1958, July, v. 35, No. 7, 335–44, 3 maps. [12 refs.]

"An account has been given of the distribution of *S. mansoni* infection in the West Nile District of Uganda in relation to the main geographical features of the area. The parasite is most prevalent in the Nile valley and along the shores of Lake Albert. The incidence gradually diminishes towards the Congo-Nile watershed. There is no transmission in areas over 5,000 feet, and no transmission in the escarpment areas where the streams breed *S. neavei* and onchocerciasis is common. Onchocerciasis and schistosomiasis are mutually exclusive diseases; snails usually cannot breed in streams favourable to the simulium vectors of onchocerciasis.

"In Arua Township anti-malarial drainage measures have reduced the incidence of schistosomiasis. Reliance on residual insecticides at the expense of more permanent anti-malarial engineering schemes may result in a marked increase in schistosomiasis.

"The movement of 20,000 labourers to and fro across Lake Albert each year has probably resulted in many new foci of transmission in the Western Uplands of West Nile. Infected persons from West Nile have probably been responsible for many new foci of transmission elsewhere in East Africa.

"The author is greatly indebted to Mr. C. Cridland of the East African Fisheries Research for assistance in the identification of snails and for carrying out transmission experiments. The most important vectors are *B. rupellii* in the Western Uplands, *B. stanleyi* on Lake Albert and *B. sudanica* on the Nile. Potential vectors are prevalent in areas where there is as yet no transmission. Research to determine the limiting conditions affecting transmission in the field will assist in deciding whether or not these areas are likely to become infected. West Nile offers ideal opportunities for any proposed research project."

Jackson, J. H. **Bilharzia. A Background to its Endemicity and Control in Africa with particular reference to Irrigation Schemes.** *South African J. Lab. & Clin. Med.* 1958, Mar., v. 4, No. 1, 1–54, 1 diagram. [91 refs.]

"This communication is an attempt to formulate the essential factors operating in the transmission of the disease, and thus to provide a means whereby an endemic situation can be assessed and control becomes devised." The attempt was stimulated by "the realization that, while much literature on the disease existed, it was difficult for the beginner to obtain a rapid and easy grasp of the factors which are responsible for the presence of the disease and which influence its endemicity". In the 50-odd pages which follow, the beginner will find much information on

the subject, though perhaps his ultimate grasp of it will not have been rapid or easy. In the presentation of the data their source is usually given from the list of 91 references at the end of the monograph, but not always, *e.g.*, in the abrupt bridging of the gap between 1250 B.C. and 1915 A.D. by the statement that "The essential facts concerning the mode of transmission of the blood flukes in man have been known since the disease was recognized" (p. 2); again, on page 35, we are told that "The cercaria is attracted to the human host by chemotaxis. . . ." In general, however, the information is accurate and the author's comments and suggestions are of value, especially in regard to general principles and methods of control of snails in relation to irrigation systems.

The monograph covers, in considerable detail, the definitive host, the snail vectors, the parasites and their ecology, water as a vector, and control of transmission. *J. J. C. Buckley*

Maldonado, J. F. & Oliver-González, J. **The Prevalence of *Schistosoma mansoni* in certain Localities of Puerto Rico—a Three Year Study.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 386–91, 5 figs. [10 refs.]

"A total of 23,262 fecal samples were examined between 1953 and 1956 from individuals in six different localities in Puerto Rico. The areas have been recognized as foci of schistosomiasis due to *S. mansoni* for many years.

"The average prevalence of infection in the six localities declined from about 22 per cent in 1953 to 11 per cent in 1955. No definite control measures had been instituted, except for limited molluscicidal activity in Guayama, and chemotherapy among infected individuals in a small focus in another area.

"Age and sex have been found important in the incidence of schistosomiasis due to *S. mansoni*. The data indicate that the greater number of cases arise between 10 and 20 years of age, and among males. Except for such places as Guayama, where the infection is an occupational hazard, it appears that the majority of infections may be acquired during the first 2 decades of life."

Rowan, W. B. **Daily Periodicity of *Schistosoma mansoni* Cercariae in Puerto Rican Waters.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 374–81, 5 figs.

"The density of *Schistosoma mansoni* cercariae in Puerto Rican waters was found to undergo a marked daily fluctuation. In the rivers and stream studied, the peak of cercarial abundance was found to occur between 11 a.m. and 1 p.m. Few cercariae were present in the water before 9 a.m. or after 4 p.m. In a heavily infested pond, cercariae

appeared at 10 a.m. and their numbers accumulated to a peak at 4 p.m. After 4 p.m., the density declined rapidly at first and then more slowly to a low at 8.30 a.m. the following morning. On the basis of these experiments, the hazard of exposure to cercariae in Puerto Rican waters is considered to be from 20 to 100-fold less between the hours of 5 a.m. and 9 a.m. than at most other times of the day.

"The recovery apparatus and technique used in these experiments are suggested as an accurate timesaving device for stream survey work, and as a useful aid to the development of more economical means of schistosomiasis control."

Barbosa, F. S. & Coelho, M. de V. Alguns aspectos epidemiológicos relacionados com a transmissão da esquistossomose em Pernambuco, Brasil. [**Some Epidemiological Aspects of the Transmission of Schistosomiasis in Pernambuco, Brazil**] *Publicações Avuls. Centro Pesquisas Aggeu Magalhães.* Recife, Brazil. 1956, v. 5, 31–47, 3 figs. [15 refs.] English summary.

An account is given of four foci of *Schistosoma mansoni* transmission in the region of Pernambuco, Brazil. In two of the localities the intermediate host is *Tropicorbis centimetralis* and in the other two it is *Australorbis glabratus*. Of each pair of sites one is a permanent stream, the other is reduced to pools in the dry season. Comparative surveys of these areas have been carried out to determine the rate of infection with *S. mansoni* in snails, human beings and house rats. The results are clearly tabulated. Some of the more interesting observations are that a very low infection rate in *T. centimetralis* can maintain the infection in human beings at the same level as that achieved by a much higher infection rate in *A. glabratus*, that the infection in *T. centimetralis* is markedly seasonal in its occurrence and that in one area 30% of the house rats examined were infected with *S. mansoni*. *C. A. Wright*

Coelho, M. de V. & Barbosa, F. S. Qualidades de vetor dos hospedeiros de *Schistosoma mansoni* no Nordeste do Brasil. III. Duração da infestação e eliminação de cercárias em *Tropicorbis centimetralis*. [**Vector Characters of Hosts of** *Schistosoma mansoni* **in North-East Brazil. III. Duration of Infection and Elimination of Cercariae in** *Tropicorbis centimetralis*] *Publicações Avuls. Centro Pesquisas Aggeu Magalhães.* Recife, Brazil. 1956, v. 5, 21–30, 3 figs. [15 refs.] English summary.

In large areas of north-east Brazil *Schistosoma mansoni* is endemic and is carried by *Tropicorbis centimetralis*. This species does not appear to be a well-adapted intermediate host: natural infections usually amount to less than 1% of the snail population. This paper describes some laboratory and field observations on host-parasite relationships between *S*

mansoni and *T. centimetralis*. Of 5 laboratory-infected snails exposed to a single miracidium each, 2 shed cercariae for 16 and 6 days respectively, then lost the infection, subsequent dissection showing no sporocysts; the remaining 3 snails shed cercariae for 1 or 2 days and then died. Naturally infected snails continued to shed cercariae for up to 91 days after being brought into the laboratory but the majority died in less than 10 days.

Histological examination of tissues of *T. centimetralis* recently invaded by miracidia of *S. mansoni* from the area where this snail is the only known host showed little host tissue reaction 24 hours after infection, but sections made 48 to 144 hours after miracidial invasion showed intense reactions with destruction of almost all of the sporocysts. A control observation on sections of *Australorbis glabratus* showed only about 10% of the sporocysts destroyed.

[For Parts I and II, see this *Bulletin*, 1956, v. 53, 1249.]

C. A. Wright

Barbosa, F. S., Carneiro, Elisabeth & Barbosa, Ivete. **On the Anatomy of *Tropicorbis chilensis* (Anton) and its Relationships to the Brazilian Planorbidae (Mollusca, Pulmonata).** *Publicações Avuls. Centro Pesquisas Aggeu Magalhães.* Recife, Brazil. 1956, v. 5, 53–60, 3 figs.

Ferreira, J. M. Aspectos endócrinos da esquistossomose mansônica hépato-esplênica. [**Endocrine Disturbances in the Hepatosplenic Form of Mansonian Schistosomiasis**] [Thesis.] 173 pp., numerous figs. [Numerous refs.] 1957. São Paulo.

In this very full thesis the author from São Paulo, Brazil, makes a comprehensive study of endocrine disturbances as seen in patients with the hepatosplenic form of *Schistosoma mansoni* infection who were born in endemic areas of that disease.

The starting-point of the study was the evidence that in affections of the liver there may occur disturbances of the balance between the liver and certain elements of the endocrine system: such phenomena have been observed in association with the hepatosplenic form of *S. mansoni* infection, but they do not appear to have been made the subject of special study. The literature on these aspects of liver involvement is reviewed in the first chapter and this leads up to the description of the present study.

The second chapter describes material and methods. 28 subjects were chosen, on strict criteria which are listed, and thereafter were divided into 3 groups, namely (1) 11 males aged 10 to 18 years with clear evidence of somatic and sexual underdevelopment, (2) 8 males aged 18 to 32 years without retarded development and (3) 9 females aged 16 to 28 without retarded development. In addition to general clinical and laboratory

examinations relating to schistosomiasis, the patients were studied in respect of (a) height and weight, bone age, serum alkaline phosphatase, blood phosphorus and cholesterol and (b) examination of external genitals, breasts and hair, seminal fluid, testicular biopsy, vaginal cytology, estimation of urinary 17-ketosteroids and gonadotrophins.

The third chapter sets out in great detail in many tables the clinical and laboratory findings specifically related to the schistosomiasis, and these included personal history, symptoms, histology of liver and spleen, rectosigmoidoscopy, blood proteins, liver function tests and haematology. These findings are mostly shown before and after treatment. 25 patients received antimonial and other medical treatment and 26 were subjected to splenectomy, either alone (12 cases), with spleno-renal anastomosis (8) or with porto-caval anastomosis (2); 4 patients had porto-caval anastomosis only.

The fourth chapter describes, also in much detail, the signs of arrested bodily and sexual development found and the results of treatment. Case histories of 11 such patients are given, together with many excellent skiagrams of the hands and skull and striking photographs of improvements in development after treatment.

The endocrine changes accompanying retarded development are fully set out in the fifth chapter and further case histories are given, together with more photographs.

Estimation of hormones is described in the sixth chapter and the whole subject and findings are discussed at length in the seventh.

The general conclusions from this study may be summarized as follows:

(1) Young patients with advanced hepatosplenic schistosomiasis show an arrest of structural, bone and sexual development.

(2) These patients have a deficiency of gonadotrophins and androgens, shown by the low urinary excretion of gonadotrophins and of 17-ketosteroids respectively. They do not appear to have somatotrophic, thyrotrophic or corticotrophic deficiency.

(3) Adult patients have disturbances of gonadal functions, probably due to gonadotrophic deficiency.

(4) In young patients, splenectomy is followed by clear stimulation of structural and sexual growth and a notable advance in bone age. In adults, observed over a long period, there is a tendency towards regularization of gonadal function.

(5) There seems to be a direct correlation between enlargement of the spleen and deficiency of gonadotrophic activity. Removal of the spleen tends to restore normal activity.

(6) The low excretion of 17-ketosteroids, even after splenectomy, reflects some disturbance of the hepatic metabolism of the androgens.

In the cases studied, the endocrine disturbances which occur in hepatosplenic schistosomiasis depend primarily on the degree of hypertrophy of the spleen. However, the participation of other factors must be taken into consideration: the degree of malnutrition and the chronicity of the

disease are conditions which are capable of depressing pituitary and gonadal functions.

This very comprehensive monograph (there are some 120 references) shows evidence of tremendous patience and careful study. Because of its very clear illustrations and tables it will repay study even by those who are not familiar with the Portuguese language.

H. J. O'D. Burke-Gaffney

Barbosa, F. S., Carneiro, J., Jr., De Moraes, Jandyra G. & Carneiro, Elisabeth. Atividade moluscocida dos sais insolúveis de cobre. [**Molluscicidal Action of Insoluble Copper Salts**] *Publicações Avuls. Centro Pesquisas Aggeu Magalhães.* Recife, Brazil. 1956, v. 5, 7–20. English summary.

An investigation into the molluscicidal activity of some insoluble salts of copper is described. The snails used in the experiments were *Tropicorbis centimetralis*, a species which favours a bottom-living habitat and eats mud. The copper salts used were the carbonate and oxide and paris green was also tried in laboratory experiments but not in the field. Copper oxide was found to be unsuitable because its irritant effect acts as a repellent to the snails. This is also the case with copper carbonate in excessively large doses under laboratory conditions. In the field a treatment of 30 gm. of copper carbonate powder per square metre of mud gave an effective kill of all snails (Ampullaridae and Physidae as well as *T. centimetralis*) but did not appear to harm aquatic arthropods. Fish tended to leave the treated area but returned within two months. Mud from treated streams still showed molluscicidal activity when tested in the laboratory a year after a single treatment with copper carbonate.

C. A. Wright

Paraense, W. L. & Pereira, O. Resultados da aplicação do pentaclorofenol como planorbicida em uma área experimental. [**The Results of the Application of Pentachlorophenate as a Molluscicide in an Experimental Area**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1957, Dec., v. 9, No. 2, 179–86. English summary.

The authors describe the results of a field trial of sodium pentachlorophenate to investigate its molluscicidal activity in a typical Brazilian focus of *Schistosoma mansoni* transmission where *Australorbis glabratus* is serving as the intermediate host. The place where the trial was carried out is a small town through which several small streams, all tributaries of a larger river, pass. One of the streams which arises in the town was completely cleared of snails for the period of observation, just over two years, after 4 treatments applied over a period of 4 months. The other streams were never permanently cleared of snails although the population was very reduced and, in some cases, temporarily disappeared altogether.

The authors conclude that complete eradication is possible only in very few localities and that single treatments with sodium pentachlorophenate are inadequate. They point out that repopulation of treated areas occurs mainly during the wet season by the reintroduction by flooding of snails which have been aestivating on the banks, also by snails from other areas being washed in. There is evidence that some snails will take refuge from this molluscicide by burrowing into mud, also that those among marginal vegetation may survive treatment [this *Bulletin*, 1956, v. 53, 897]. It is significant that in some localities the snails found to have survived treatment were all small and many showed the presence of apertural lamellae, a feature which the senior author has shown in a previous publication to indicate a resting phase in the snails during which they show great resistance to desiccation. *C. A. Wright*

Ashley, J. N., Collins, R. F., Davis, M. & Sirett, N. E. **The Chemotherapy of Schistosomiasis. Part I. Derivatives and Analogues of αω-Di-(p-aminophenoxy)alkanes.** *J. Chem. Soc.* 1958, Oct., 3298–3313. [Refs. in footnotes.]

"A series of αω-di-(*p*-aminophenoxy)alkanes of the general formula (I; R = R′ = H) has been prepared and tested against *Schistosoma mansoni* infections in mice. Modifications of this fundamental molecular type which have been explored, in an attempt to establish a structure–activity relationship, include substitution in the amino-groups, the rings, and the central chain, and replacement of the central chain by other linkages. Many of the compounds exhibit high schistosomicidal activity."

Kuo, Pang-Fu & Chiang, Shao-Chih. **Observations on Skeletal Development in Schistosomiasis Dwarfism.** *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 144–7, 4 figs. on pl.

The present authors, with others [this *Bulletin*, 1957, v. 54, 1329], have already made observations on this condition. 12 patients, 10 male and 2 female of 18 to 30 years of age, with schistosomal [Far Eastern] dwarfism, have been the subjects of X-ray studies of their skulls, vertebrae, long bones, wrists, ankles and pelves. Special attention was directed to the epiphyses, epiphyseal lines, bone trabeculation, degrees of calcification, and the dimensions of the long bones. All but one patient with severe ascites were treated with antimony and when available (4) were re-examined after a year. Data are set out relative to the findings in these dwarfs and those in normal controls, and also in the 4 seen before and a year after treatment.

The general conclusion reached is that there was no bone destruction in the dwarfs but retardation of skeletal development, particularly of the long bones, similar to that occurring in hypogonadism. The cause probably is depression of the activity of the anterior lobe of the pituitary

with deficiency in the growth and gonadotrophic hormones. The defects were markedly lessened by specific treatment with antimony; the earlier this treatment was given the better the end result.

A. R. D. Adams

Moon, A. P., Frick, L. P. & Asakura, S. **Laboratory Screening of Compounds for Molluscicidal Activity against** *Oncomelania nosophora* **with an Immersion Test and a Modified Plate Test.** *Amer. J. Trop. Med. & Hyg.* 1958, May, v. 7, No. 3, 295–7. [11 refs.]

"An immersion test for screening chemicals for molluscicidal activity against *Oncomelania nosophora* snails and a modification of the McMullen plate test [this *Bulletin*, 1951, v. 48, 1019] are described. Results of screening 89 compounds by these methods are given. Twenty-four compounds had an LD50 of less than 0·1 mg (5 ppm) by the immersion test and 0·2 mg (100 ppm) by the plate test. Sodium pentachlorophenate and dinitro-o-cyclohexylphenol were control chemicals. It is believed that the immersion test eliminates several variables inherent in the plate test and that it is preferable for screening of molluscicides in the laboratory."

Bonsel, J., Stam, A. B., Stam-Mielziner, S. J. & Van Thiel, P. H. **Schistosoma Dermatitis in the Hague.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 239–44, 5 figs.

"In June, 1957, a papular dermatitis was observed in a number of persons who had bathed in a ditch in The Hague. Dermatitis pratensis could be excluded; schistosoma dermatitis was considered probable. Cercariae belonging to the *ocellata* group were demonstrated in 40 snails (*Limnaea stagnalis*) collected in the broad, shallow ditch. After experimental infection with these cercariae a test person developed dermatitis."

Ito, J. **Studies on the Brackish Water Cercariae in Japan. III. Three new Echinostome Cercariae in Tokyo Bay, with a List of Japanese Echinostome Cercariae (Trematoda).** *Japanese J. Med. Sci. & Biol.* 1957, Dec., v. 10, No. 6, 439–53, 17 figs. [28 refs.]

Yamaguchi, T., Nishimoto, M., Sakamoto, Y., Hirose, H. & Shigeyasu, M. [**An Epidemiological Survey of Paragonimiasis in Takaoka-cho, Kochi Prefecture**] *Shikoku Acta Med.* 1958, July, v. 13, No. 1, 105–10, 1 map & 1 chart. [In Japanese.] English summary.

The authors, from Tokushima University School of Medicine and Kochi National Hospital, made a survey of paragonimiasis in man in Takaoka-cho in April 1958. Intradermal tests with *Paragonimus westermani* antigen were made (0·05 cc. of a 1 in 10,000 dilution, read after 15

minutes). Of 2,098 persons tested 26·6% were positive (33·2% males, 21·3% females).

11·8% of 629 high school students were positive (16·8% males, 8·2% females).

Of the 632 persons who were positive to intradermal tests, the sputum was examined in 249; *Paragonimus* eggs were found in 18 (7·2%).

H. J. O'D. Burke-Gaffney

Buck, A. A., Lieske, H. & Haage, H. Ein Fall von Paragonimiasis der Niere. [**A Case of Paragonimiasis of the Kidney**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 212–16, 2 figs. [12 refs.]

The English summary appended to the paper is as follows:—

"A rare case of paragonimiasis of the kidney, with eggs of the trematode (*Paragonimus westermanni*) detectable in the urine, is reported from Korea. The right calyx of kidney and its ureter could be localized as focus of the infection.

"After Resochin treatment, neither in the urine nor in the sputum of the patient were eggs found. However, it has not been determined as yet whether the Resochin therapy applied can be considered a cure for paragonimiasis, or whether it just caused temporary sterilization of the flukes."

Butt, A. J. & Baehr, J. J. **Cysticercosis: Report of Two Cases—One with Giant Vesical Calculus.** *Southern Med. J.* 1958, Sept., v. 51, No. 9, 1190–92, 4 figs.

Rosen, S. W. & Kiefer, E. D. **Treatment of Tapeworm Infestation. Report on an Effective Treatment without Toxic Effects on Host.** *J. Amer. Med. Ass.* 1958, Aug. 23, v. 167, No. 17, 2065–7. [18 refs.]

Infections with both *Taenia saginata* and *T. solium* occur in the region of Boston, U.S.A. All the advocated taenicides are toxic to the host. De Rivas [this *Bulletin*, 1933, v. 30, 206] showed that these worms are killed within 5 minutes by immersion in glycerin or saline solutions at 130° to 140°F. He successfully relieved patients of tapeworms by tubal administration of solutions into the duodenum at this temperature. The present authors have similarly successfully dislodged tapeworms from 36 of 40 patients with solutions of glycerin, magnesium sulphate and saline at 130°F. When the tip of the tube is seen radiologically to be well down the duodenum 1½ oz. of magnesium sulphate solution is introduced; this immediately is followed by 1½ oz. of glycerin, then 2 oz. of equal parts magnesium sulphate solution and glycerin, and finally by 500 cc. of saline solution at 54°–60°C. (130°–140°F.). In most cases the entire

worm was expelled within 15 minutes. No side-effects other than a flushing sensation and mild tachycardia were noted. *A. R. D. Adams*

Schmid, R. Die Echinokokken-Krankheit in der Schweiz, 1926–1955. [**Hydatid Disease in Switzerland**] *Acta Tropica.* Basle. 1958, v. 15, No. 1, 65–81, 2 maps. [12 refs.]

Dardel in a monograph in 1927 collected the recorded cases of *Echinococcus alveolaris* and *E. cysticus* occurring in Switzerland until 1925. This report discusses the human cases of Swiss origin since 1926–1955. [*E. cysticus* is the name given by Piekarski to the unilocular form of *E. granulosus.*]

Up to 1900, 28 cases of *E. alveolaris* and 14 of *E. cysticus* were recorded; from 1900 to 1924 the corresponding figures were 70 and 56, and from 1926 to 1955, 89 and 38. The distribution has remained roughly constant; *E. alveolaris* occurs all over the country but mostly in the north-east near the German border, *E. cysticus* occurs with a thinner distribution all over, but mostly in the south-west near the French border.

The records obtained in this present survey were derived from material sent for diagnosis to the Institutes for Pathology at Zurich, St. Gallen, Basel, Lucerne, Aarau, Berne, Lausanne and Genf and from the cancer records. Most of the diagnoses were made post mortem, the clinical records were available in many cases, but the relevant epidemiological details were usually lacking. It is believed that all cases considered were accurately diagnosed, but that other cases might have escaped detection.

The records are arranged in age-groups, and the distribution shown in cantons, hospitals and institutes. Both *E. alveolaris* and *E. cysticus* are commoner in housewives than in those of any other occupation.

Of 89 cases of *E. alveolaris*, 88 occurred in the liver; of 33 patients operated upon, 25 died shortly afterwards. In 18 of 67 studied post mortem the clinical diagnosis had been correct, in 15 no definite diagnosis had been made, 16 had been diagnosed as jaundice or hepatitis, 18 as malignancy, tuberculosis or cirrhosis. In some there had been direct spread to the lungs and in others separate tumours were found in the lungs, spleen, brain, peritoneum and diaphragm.

Of 38 cases of *E. cysticus* 26 occurred in the liver. Of these 38, 22 were correctly diagnosed but in 16 the condition was unsuspected during life. *W. E. Kershaw*

Gaud, J. A propos de l'ankylostomose. Peut-on parler de maladies parasitaires professionnelles au Maroc ? [**Ankylostomiasis. Can one speak of Occupational Parasitic Diseases in Morocco ?**] *Maroc Méd.* 1958, Apr., v. 37, No. 395, 486–7.

Ankylostomiasis is, in Morocco, the only parasitic disease that is clearly related to the work of the people infected.

It is not a generalized disease in Morocco, as it is in the greater part of countries in the intertropical zone. In Morocco it is a strictly occupational disease, as it is in Europe, occurring in underground workers (*e.g.*, miners), because, although both children and adults go barefoot and wear shoes and stockings (*chaussures*) for ornament rather than protection, the climatic conditions (very low humidity, marked variations of temperature, power of the sun and lack of protection from it owing to the poor vegetation) prevent the development of the infective larvae.

Localization of the disease in relation to occupation is, however, stricter in Morocco than it is in Europe. In Morocco ankylostomiasis is practically a disease of the workers in the phosphate mines. Discussing the reasons for this, the author suggests that the absence of ankylostomiasis from the lead, antimony, cobalt and manganese mines is due to the toxicity of these minerals for the infective larvae, though the salinity of the drainage water from the mines merits investigation. But ankylostomiasis is also absent from the coal mines of Jerada and the workers engaged in drilling tunnels (especially the tunnel under the Jbel Rnim to divert the water of the Bin el Ouidane barrage towards the plain of Tadla). The author suggests that the absence of ankylostomiasis from the Jerada coal mines may be due to the fact that the coal seams in these mines are narrow, so that many of the galleries are also narrow and this does not favour defaecation *in situ*, so that the dissemination of ankylostomiasis is not favoured. This explanation is given with reserve, but it does not explain the absence of the disease from the tunnel workers. Here there may be an unknown local cause for the absence of the disease, or perhaps the strict control measures are responsible; but it should be emphasized that there are, in these workings, two kinds of labour, namely, workers who have already worked in other mines and local labourers who have temporarily left agricultural or pastoral work. Carriers of ankylostomes could only be among the former; but they are relatively few and they are all technically qualified workers of a rather high social level, with personal habits that do not favour the spread of the disease. The employment of so many unskilled workers is deplorable, but it has the slight advantage that it reduces the spread of ankylostomiasis and, when the labour force is not permanent, can without doubt suffice to prevent the appearance of symptoms of the disease. *G. Lapage*

YANAGIHARA, T. [**Endemic Study on Hookworm Disease in Eastern Area of Shikoku**] *Shikoku Acta Med.* 1958, July, v. 13, No. 1. 50–70, 1 map. [53 refs.] [In Japanese.] English summary.

Since 1955 the author, from Tokushima University School of Medicine, has made a survey of hookworm disease in the eastern area of Shikoku including Tokushima prefecture and part of Kagawa prefecture.

3 direct smears of faeces of each of 20,000 persons indicated a general

incidence of infection of about 14%, but in rural areas it was at least 30%. Infection was higher in females and in those between the ages of 20 and 60 years.

1,294 persons were given an average single (adult) dose of 4·5 gm. tetrachlorethylene: 72·8% expelled hookworms. When 465 patients were re-examined 3 to 8 weeks later, it was found that 62% no longer expelled hookworms.

Ancylostoma accounted for 75·2% of cases, *Necator* for 10·4%, and both species for 14·4%. *Necator* infection was higher in females.

13,406 worms were collected in filtered faeces of which 66·5% were *Ancylostoma* and 33·5% *Necator*. The largest numbers of worms of each species expelled were respectively 344 and 631 and the average number per person 10·6 and 19·2. *H. J. O'D. Burke-Gaffney*

Kikuchi, H. [**Experimental Study on Duodenitis caused by** *Trichostrongylus orientalis*] *Hirosaki Med. J.* 1958, June 30, v. 9, No. 2, 267–80, 10 figs. on 2 pls. [36 refs.] [In Japanese.] English summary *42–3.

Saz, H. J., Vidrine, A., Jr. & Hubbard, Jeanette A. **The Formation of α-Acetolactic Acid and Acetylmethylcarbinol by** *Ascaris lumbricoides*. *Exper. Parasit.* New York. 1958, Sept., v. 7, No. 5, 477–90, 5 figs. [18 refs.]

Thannisch, G. **Multiple Hepatic Abscesses due to** *Ascaris lumbricoides*. **Case Report.** *J. Pediatrics*. St. Louis. 1958, Nov., v. 53, No. 5, 602–7, 3 figs. [18 refs.]

"A case of ascaris infestation complicated by multiple hepatic abscesses is presented. In one of the abscesses fertilized ova and a portion of the parasite were demonstrated by biopsy. It is felt that the abscesses in the liver were due to the migration of the adult worm through the biliary radicals, and that the migration was associated with the administration of gentian violet. A plan of therapy is presented. This case represents a serious and infrequent complication of a common condition encountered in pediatric practice, and shows that ascariasis cannot be considered an entirely benign condition."

Chu, Shou-Ho. **Oxygen Treatment of Ascariasis in Children.** *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 151–2, 1 fig.

Kravetz in the Soviet Union is stated to have found that ascarids in pigs would not survive an oxygen environment for more than one hour,

and he is stated to have found oxygen treatment to be 67% to 100% effective in human intestinal ascariasis. This level of efficacy is stated to have been obtained also by Yang in China. For the treatment of children oxygen is introduced into the patient's intestine by a stomach tube or catheter at a rate of 30 to 50 ml. per minutes to a total of 100–150 ml. per year of age, from an artificial pneumothorax or similar apparatus. An enema may be given the night before, the stomach is kept empty on the day of treatment, and the patient is kept in bed during it and for half an hour thereafter. A saline purge is given after 2 hours.

557 patients, aged 1 to 14 years, have been so treated for ascariasis by other Chinese workers and the successful expulsion of the worms is reported to range from 68·4% to 86·3%. The author personally has treated 148 patients with 70·3% success.

The treatment proved safe and simple without need for hospital retention. It was particularly effective in relieving partial intestinal obstructions with the worms, and it is claimed that it may forestall operative interference except in complete obstruction. The oxygen treatment is contraindicated only in patients with peptic ulcers, peritonitis or acute infectious diseases.

[See also this *Bulletin*, 1956, v. 53, 345.] *A. R. D. Adams*

Ureles, A. L. **Two Case Histories of a Serum Sickness-Like Reaction following Piperazine Citrate (Antepar).** *Antibiotic Med.* New York. 1958, Sept., v. 5, No. 9, 585–6.

"Two cases of serum sickness-like reactions are reported following the administration of piperazine citrate. The response of antihistamine and prednisolone is noted."

Van Rensburg, L. C. J. & Kark, A. E. **Roundworm** (*Ascaris lumbricoides*) **Infestation. Its Surgical Problems.** *Med. Proc.* Johannesburg. 1958, July 26, v. 4, No. 15, 522–36, 3 figs. [42 refs.]

Roundworms are found in over 80% of the non-white population of the Durban area. They generally cause little observable damage to their host yet their possible role in the aetiology of surgical conditions, particularly of the bowel, must not be overlooked.

These worms feed on the chyme and in heavy infections may contribute to malnutrition of the host. Anaemia of an iron deficiency type is commonly associated, and at some stage of the life cycle of the worm allergic manifestations may be encountered with an eosinophilia. The restless adult ascarids wander widely and may enter every orifice of the body. Individual worms may often be palpated abdominally in thin subjects and they resemble a length of stiff wire.

The surgical problems connected with these worms are many and varied. Mechanical intestinal obstruction is the commonest, and this may be an intermittent occlusion at first with, possibly, spasm of the lower ileum (Aird, *A Companion in Surgical Studies*, 1949. Edinburgh: E. & S. Livingstone). Such a condition must be watched carefully and the use of antispasmodics such as pethidine and atropine, combined with enemata and liquid paraffin, may be sufficient to permit the masses of worms to pass on their way. No vermifuges should be given at this stage, for dead or dying worms tend to precipitate complete obstruction. When this has occurred a putty-like mobile mass is palpable and the lesion can often be recognized on a scout X-ray examination. These patients present the typical picture of acute small bowel obstruction and need immediate laparotomy. When possible the worms should be milked past the site of obstruction into the caecum, but enterotomy or resection of the affected loop may be necessary in late cases.

Intussusception has rarely been proved to be specifically due to roundworms, although it is highly probable that the administration of a vermifuge induces hyperperistalsis of the bowel and the presence of worms might then initiate the condition. 2 cases are described to illustrate this. Volvulus was found at operation in one case in which the twisted loop was full of worms. After untwisting, the worms were milked onwards and the child recovered. A case of acute appendicitis with a roundworm impacted in an inflamed appendix is described and another in which Meckel's diverticulitis was perforated. No worm was found in the diverticulum or the peritoneal cavity, although several were present higher in the bowel. Another example of perforation of the bowel is a case in which a small duodenal perforation was associated with a roundworm in the lesser sac. The progress of the disease here gave grounds for thinking that the original perforation had been temporarily blocked by the passage of this worm which later migrated right out into the lesser sac.

Biliary obstruction due to roundworms is discussed and a case described which at post mortem revealed the intrahepatic biliary ducts full of worms and a condition of early suppurative cholangitis. Invasion of the genito-urinary tract is also discussed, and a case of traumatic vesico-intestinal fistula described in which roundworms had migrated presumably from the bowel into the bladder to appear in the suprapubic wound.

The statement that roundworms are liable to perforate recent suture lines and thereby lead to post-operative peritonitis is not confirmed by the experience at this hospital where the majority of patients coming to abdominal operation have roundworms in the bowel. The conclusion is that the presence of roundworms *per se* should be no deterrent to any operative procedure and that the worms have little or no effect upon post-operative progress. *J. R. Rose*

FERNANDO, N. **Surgical Ascariasis in Children. (A Review of 50 Cases.)** *J. Trop. Pediatrics.* London. 1958, Sept., v. 4, No. 2, 61–70. 1 fig. [18 refs.]

One of the commonest helminthic infections, ascariasis is rarely thought of as a possible source of danger to life, but in the Children's Hospital, Colombo, where this review (based on 50 cases) was made, it was found to be a significant cause of acute surgical conditions and had a mortality of 46%. Laparotomy in all cases revealed one or more of the following conditions: intestinal obstruction, acute peritonitis with or without bowel perforation, intussusception and volvulus.

By far the commonest lesion found was acute obstruction of the small intestine (usually near the ileo-caecal valve) due to a mass of roundworms more or less tightly filling the lumen. This sometimes so interfered with the blood supply that gangrene had set in. In most cases the giving of vermifuges (particularly santonin) had precipitated the trouble and it is suggested that anthelmintics, by killing or irritating the worms, had caused them to secrete their slimy and toxic fluid which may have added to the spasm of the bowel wall. Symptoms were abdominal pain with vomiting, constipation and then abdominal distension with marked toxaemia. 4 cases of intussusception associated with roundworms in large numbers in the bowel above or below the lesion are presented. 3 cases of volvulus, all fatal, had the affected loop of small intestine packed tightly with the worms. Acute peritonitis was found associated with a perforation of the appendix (tip or base) in 11 cases and in others the jejunum or ileum had perforations. In 4 cases no perforation could be detected although roundworms were found in the peritoneal cavity. It may be that the worms can migrate through the intestinal wall leaving only a small perforation which is rapidly sealed off. In 2 instances where worms were discharged through the umbilicus it was found that a Meckel's diverticulum had become perforated and adherent to the umbilicus. No case of biliary tract obstruction is described, but reports from ADAMS [this *Bulletin*, 1935, v. 32, 636] and NOVIS [*Brit. J. Surgery*, 1923, v. 10, 421; this *Bulletin*, 1924, v. 21, (238)] are quoted.

Diagnosis in countries where ascariasis is common (37·1% of children seen at this hospital were found to be infected [DE SILVA, this *Bulletin*, 1958, v. 55, 289]) will depend partly on the history of recent vermifuge treatment followed by the usual signs and symptoms of the acute surgical conditions described above. The direct palpation of the worms in masses through the thin abdominal wall of these undernourished children is an important aid to diagnosis. Treatment in early cases may be by high enemata and liquid paraffin in large doses. In later cases (such as those reviewed here) there are three methods of dealing with the obstructing mass of worms. The first is milking them down into the caecum. This is the simplest but is not always possible and may traumatize the bowel wall and liberate more toxins. The second is enterotomy and removal

of the worms. One risk of this is the possible migration of other worms through the suture line. The third is enterectomy, which is only employed in late and gangrenous cases and carries a high mortality.

J. R. Rose

Subramaniam, H. & Tampi, M. R. V. **Notes on the Seasonal Variations in the Density of *Culex fatigans* and Filarial Infections in them, in Mangalore Town, Madras State.** *Indian J. Malariology.* 1958, June, v. 12, No. 2, 77–88, 3 graphs.

In a survey covering the years 1954–1955 and part of 1956 the population density of *Culex fatigans* in Mangalore Town, Madras State, was studied and related to relative humidity and rainfall. In addition infection rates in the vector were studied and found to be maximal when the relative humidity was 80% and above during the monsoon months of June to October. The peak infection rate recorded was 23·2% in June 1954 when the relative humidity was 92%; the minimum infection rate was 3·2% in January.

Observations were also made on breeding sites of *C. fatigans* in the town and it was noted that the peak of mosquito density occurred after the end of the rainy season when drains and paddy fields, no longer flushed by rain, provided stagnant collections of water suitable for breeding.

E. R. Nye

Krishnan, K. S., Raghavan, N. G. S., Nair, C. P. & Mammen, M. L. **Comparative Field Trials on the Residual Effectiveness of D.D.T., Malathion and Diazinon.** *Indian J. Malariology.* 1958, Mar., v. 12, No. 1, 43–8, 1 map.

The insecticides were being tested as measures to destroy culicine mosquito vectors of filariasis. The trials were conducted in 4 villages in Kerala State containing from 253 to 428 houses and populations ranging from 1,375 to 2,480 persons. Although the trials were mainly directed against *Mansonioides* spp., it was found that only about 5% of the mosquitoes caught in houses belonged to this genus. The most common species (in order) were: *Culex gelidus*, *C. vishnui* and *Anopheles subpictus*. Accordingly, the residual powers of the insecticides were judged from their effects on the total house collections of mosquitoes. The 4 villages were treated as follows: (1) houses sprayed with DDT at 200 mgm./sq. ft.; (2) sprayed with malathion at 25 mgm./sq. ft.; (3) sprayed with Diazinon at 25 mgm./sq. ft.; (4) left unsprayed for comparison.

The results showed that DDT considerably reduced the population of mosquitoes for 5 weeks; and even though numbers rose at 6 weeks, they remained well below those of the untreated village and untreated houses

for about 10 weeks. The malathion produced a reduction for only about a week and Diazinon for 3–4 weeks.

Dissections of mosquitoes for filarial infection were made before and after treatments but the numbers were too low to provide reliable conclusions.

[See also this *Bulletin*, 1957, v. 54, 464.] *J. R. Busvine*

Wharton, R. H., Edeson, J. F. B., Wilson, T. & Reid, J. A. **Studies on Filariasis in Malaya: Pilot Experiments in the Control of Filariasis due to *Wuchereria malayi* in East Pahang.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 191–205, 2 figs. [16 refs.]

The results of three different treatments, in three villages near the Pahang River, Malaya, for the control of *Wuchereria malayi* are compared and discussed. In one village weekly administration of diethylcarbamazine (first dose 0·5 mgm./kgm. of body weight, second dose 1 mgm./kgm., and then 6 doses of 5 mgm./kgm.) reduced the human microfilarial rate from 49% to 10% and the mean number of microfilariae from 19·7 to 0·26 per 20 cmm. of peripheral blood. In a second village monthly administration of diethylcarbamazine (5 mgm./kgm. for 6 months) reduced the microfilarial rate from 35% to 6% and the mean number of microfilariae from 11·2 to 0·16 per 20 cmm. of blood. In the third village spraying with dieldrin (approximately 100 mgm. of insecticide per square foot) produced no obvious change in the human microfilarial infection. In all three villages the control measures produced no apparent change in the biting density of *Mansonioides longipalpis*, the principal vector, nor in the rate of infection of the mosquito.

Both *Wuchereria malayi* and *W. pahangi* are present in the district and the larvae are indistinguishable in the mosquito.

It is believed that the failure of the control measures may be due partly to the small area brought under control and also to the presence of reservoir infections in domestic and forest animals.

The results are set out in great detail in 8 tables and a figure and there is a map of the areas concerned. *B. R. Laurence*

Edeson, J. F. B. & Wharton, R. H. **The Experimental Transmission of *Wuchereria malayi* from Man to Various Animals in Malaya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Jan., v. 52, No. 1, 25–38, 3 figs. [15 refs.] Discussion 39–45 [Buckley, J. J. C.; Gordon, R. M.; Bertram, D. S.; Hawking, F.; Manson-Bahr, P.; Boyd, J. S. K. (President); Edeson, J. F. B. (in reply)].

A study of filariasis due to *Wuchereria malayi* was started in 1953 in Kuantan, East Pahang, Federation of Malaya, as a preliminary to possible control measures.

Microfilariae indistinguishable from those of *W. malayi* in man had been found by Poynton and Hodgkin, and Hodgkin [see this *Bulletin*, 1939, v. 36, 839; 1941, v. 38, 153] in species of Malayan monkey but transmission experiments from man to monkey had not been successful.

In East Pahang in 1954, 4 out of 62 wild monkeys were found to be infected. Attempts were then made to " identify the monkey parasite and to attempt transmission of the infection from monkey to man and from man to monkey. While these transmission experiments were in progress, the chance finding of *malayi*-like microfilariae in a dog led us to examine a number of other animals with the result that similar parasites were found in three primates, the long-tailed macaque, the banded leaf monkey and the slow loris, and two carnivores, the domestic dog and the domestic cat (Edeson, Wharton and Buckley, 1955 [*ibid.*, 1956, v. 53, 349]). Adult worms obtained from some of these animals were provisionally identified as *W. malayi*, while others were described as a new species, *W. pahangi* (Buckley and Edeson, 1956 [*ibid.*, 1956, v. 53, 1156]). Later examinations have revealed four other animals infected with *malayi*-like microfilariae, three carnivores, the tiger (*Panthera tigris*), the flat-headed cat (*Felis planiceps*) and the Malay civet cat (*Viverra tangalunga*), and one insectivore, the scaly ant-eater (*Manis javanica*). These findings led us to try to transmit *W. malayi* experimentally to animals other than monkeys, and successful transmission from man to the domestic cat has already been reported (Edeson and Wharton, 1957 [*ibid.*, 1958, v. 55, 196]). The present paper gives details of all the transmission results with various animals up till the end of June, 1957 ".

Transmission of Wuchereria malayi to forest and domestic animals

" Eleven monkeys were inoculated with infective larvae of *W. malayi* from man; 3 were infected with larvae from Monkey 4 from which adult worms, tentatively identified as *W. malayi* were recovered later (Buckley and Edeson, 1956 [*loc. cit.*]); another was infected from Cat 41 which had been infected from man and from which, at subsequent postmortem. adult *W. malayi* were recovered (Edeson and Wharton, 1957 [*loc. cit.*]). . . . In five of the monkeys infection by mosquito bites was attempted; infective larvae were placed on the scarified skin of one monkey as well as being injected; in the rest injection alone was used.

" Only two monkeys . . . became positive for microfilariae. . . . Immature *Wuchereria* sp. were recovered from two other monkeys which died during the pre-patent period and in a third a developing worm was seen but not recovered at postmortem. . . . The monkeys which showed microfilariae or from which developing worms were recovered were all relatively young (less than 1 year). The disappointing results from the long-tailed macaque monkeys appear to indicate that *M. irus* is not a good host. . . . These findings are in accord with the incidence of infection among the monkey population in East Pahang where only 6 per cent. (4/62) were found infected with *malayi*-like microfilariae. . . .

" . . . the slow loris does not seem to be an efficient host for *W. malayi*. Though transmission was achieved in five out of six animals (the sixth

was still negative 171 days after inoculation) the numbers of microfilariae have been much less than those found in cats. . . .

" Fifty-nine domestic cats have been inoculated with the infective larvae of *W. malayi*; of these 35 died at varying periods during the prepatent period and developing *W. malayi* were recovered from 25 of them. Every one of the 24 cats which survived longer than 75 days became positive for *malayi*-like microfilariae. . . .

" The ease with which *W. malayi* infections can be established in cats is in marked contrast to the difficulty experienced with monkeys."

The course of the transmitted infection in most of the cats has shown a steady increase in the number of microfilariae in the peripheral blood for a year or more, indicating that the infections are well established and are not transient.

" The counts in the long-tailed macaque monkeys and in the slow loris have not shown such a well-marked increase, suggesting that the parasite is not so well adapted to these hosts. The civet cat also appears to be an indifferent host while the rhesus monkey is probably more suitable."

Wuchereria malayi thus develops in a wide range of animal hosts. A strain obtained from man has been passaged to a long-tailed macaque monkey, a domestic cat and a slow loris. Another strain has been passaged through 3 cats, and a third has been passed from man to cat and thence to a rhesus monkey.

All the evidence strongly suggests the existence of such an animal reservoir of *W. malayi* in East Pahang. Among animals obtained from the endemic area, natural infections were common in cats, and were present in monkeys, but the extent and importance of the animal reservoir are at present unknown. Many species of animals have not yet been examined, while others have not been examined in sufficient numbers and virtually nothing is known of the population and movements of wild animal species in the area. Until more work is done the size of the animal reservoir or its probable influence on attempts to control or eradicate the disease in man cannot be assessed. The early results of some small-scale control schemes now in progress suggest complete or permanent control in this area will be difficult to achieve.

" The complexity of the problem is increased by the presence of *W. pahangi* in forest and domestic animals in the same region (Buckley and Edeson, 1956 [*loc. cit.*]). Both parasites will develop to maturity in *M. longipalpis*, and though this mosquito is a less efficient host for *W. pahangi* than for *W. malayi*, the mature larvae are indistinguishable. At present we cannot say definitely that *W. pahangi* is not transmissible to man but the indications are that this parasite does not occur naturally in the human population in East Pahang, Malaya. Its presence in a variety of animals, however, inevitably confuses the dissection results in wild-caught mosquitoes, and is likely to frustrate this particular method of studying the effect of control measures.

" Cats have been found infected [with *malayi*-like microfilariae] in Orissa State, India (Pattanyak and Raghavan, 1956 [this *Bulletin*,

1957, v. 54, 730]), and cats and dogs have been found infected in the island of Pate, off the coast of Kenya (Nelson and Heisch, 1957 [*ibid.*, 1957, v. 54, 592]). This finding in East Africa is of particular interest as the human population is infected with *W. bancrofti* but not, apparently, with *W. malayi.*"

Some of the points made in the discussion were as follows:—

J. J. C. Buckley:

"The task of proving that certain animals are potential reservoirs of this serious infection of man is clearly no light undertaking, both from the technological aspect and in view of the consequences of such a finding and its bearing on the possibilities of control; but there can be little doubt now that certain animals, in particular the domestic cat, must be regarded as serious complicating factors in any control scheme. It is of little account that the experimental transmissions were one-way only, namely man to animal; there is no reason for believing, nor any precedent to suggest, that animal-to-man transmission cannot also take place, and with equal facility.

"Another important consequence of the transmission work . . . is that we are much more familiar now with the adult worms and have a better understanding of the relationships of the different members of this group . . . two distinct species have been isolated in Malaya . . . *W. pahangi*, has been found as a natural infection in dogs, cats, wild cat, tiger, civet cat and the slow loris, but . . . not so far being isolated from man. These three species, two from Malaya and one from Africa, constitute a well-defined group, whose members are linked together by the close similarity of their microfilariae and by morphological characteristics in the adults which are not seen in any other kind of filarial worm. These are good and valid reasons for removing them from the genus Wuchereria and a new genus must be erected for them."

Professor R. M. Gordon:

Much of the work on *W. malayi* has run parallel with the work on loiasis which is going on in West Africa. It is reasonable to believe that, in laboratory conditions, the infection transmitted from man to animals by a particular mosquito vector can be transmitted back to man by the same species. But to what extent is this occurring in nature?

"The workers at the Helminthiasis Research Unit at Kumba have shown that in this area there are two distinct strains, or perhaps two distinct species, of filarial worms occurring in the genus *Loa*. One of these is the well-recognized species *Loa loa* which parasitizes man and whose larvae, which show a well-marked diurnal periodicity, reach the infective stage in various species of Chrysops, *C. silacea* being the chief vector. . . . The workers at Kumba do not know whether the simian strain can be transmitted from monkey to man, but they know that the microfilariae reach the infective stage in species of Chrysops which bite man. Its absence from the human host under natural conditions is explicable on the basis that *C. langi* is a night-biting, canopy-haunting species, which seldom, if ever, makes contact with man; while *C. silacea* which does bite man is a day-biting species and therefore has no access to microfilariae with a nocturnal periodicity."

Professor D. S. Bertram:

Professor Bertram wondered whether site selection in cotton rat filariasis might not be compared with site-selection in infection with Malayan filariasis.

Wild-caught mosquitoes might derive infections from any of the animals harbouring *W. malayi*-like and *malayi* infections, and from cattle harbouring the setariae.

Dr. F. Hawking:

"The length of the latent periods is also interesting. With *Litomosoides* or cotton-rats it is only 50 days, but in the filarial worms of larger animals that we have studied, it is much larger, *e.g.*, with *Dirofilaria repens* of dogs it is 6 months, with *D. immitis* of dogs it is 8 months, and with *D. aethiops* of *Ceropithecus aethiops* it is 11 months. Therefore, it is surprising that *Wuchereria malayi* develops in cats with a latent period of only 2½ months. Possibly the Pahang strain of *W. malayi*, with which Dr. Edeson and Mr. Wharton have worked, is a rather atypical filaria, as evidenced by its short latent period, its incomplete microfilarial periodicity, and its high rate of infection among young children. In all these respects it differs from human wuchererias known in other parts of the world.

"If there is an effective animal reservoir such eradication of the human infection would not prevent reinfection of the population from domestic or wild fauna. For this to happen in practice, however, two conditions must be fulfilled (1) the human filariae must develop vigorously in animals so that many microfilariae are produced and the infection is readily transferred to fresh animals thus ensuring continued propagation. (2) There must be effective contact between animals and man, so that frequent transmission can occur. In most parts of the world where human filariasis is endemic there is still no suggestion of any animal reservoir. Such a reservoir has been suggested only in a limited number of localities. . . .

"I submit that until definite evidence to the contrary has been produced in any particular area, it should be held as a working hypothesis that the chief reservoir of infection for human filariasis lies in man himself. I hope that whenever possible public health campaigns will be taken to suppress or eradicate this human reservoir of infection, and that those responsible for initiating such campaigns will not be deterred by the bogey of a possible animal reservoir."

Sir Philip Manson-Bahr:

Sir Philip Manson-Bahr said that it seemed to him as if this helminthiasis should now be classified as a zoonosis, on the grounds that the various phases which Dr. Edeson had described could be traced from their primitive stages as a zoonotic infection of wild animals to a reservoir for man in the domesticated cat and dog, and to their final evolution as the cause of human disease transmitted directly by *Mansonia longipalpis* from one man to another. If this was the correct interpretation of the story for *W. malayi*, it must have been the pattern for *W. bancrofti* and other forms of filariasis. The question of periodicity was one of the

apparently insoluble problems which now might be solved. He had been informed that the periodicity of *W. malayi* in man differed on the East Coast of Malaya from that on the West.

The President:

"He [Dr. Edeson] has said that *Mansonia* is very catholic in its feeding habits, but that he has found it difficult to get infected mosquitoes to bite the cat. Has he examined 'wild' mosquitoes caught in human habitations to find out to what extent they are feeding on the domestic cats—there is a delicate test by which the source of the blood in an insect's stomach can be identified? It seems to me that, unless *Mansonia* has a strong predilection for cat's blood, it will inevitably, when in a domestic environment, feed much more frequently on the large, easily accessible, and lethargic human beings than on the small, hairy, active, and perhaps . . . mosquito-eating cats. . . . In any event, if man is bitten much oftener than the cat, as seems very likely . . . it may be not that the cat is the reservoir of infection from which man is infected with *Wuchereria malayi*, but that man is the reservoir from which the cat is infected."

Dr. Edeson (in reply):

"Information is slowly being collected by Mr. Wharton on the feeding preferences of the vector mosquitoes and he will, in time, know more about the relative attractiveness of the various animal hosts including man."

Concerning Professor Gordon's remarks, "We have no definite proof that the infection can be transmitted from animals to man. We know that some of the animal hosts live in fairly close association with man and that *M. longipalpis* will bite any of the hosts under suitable conditions. Unlike *L. loa* the periodicity does not seem to differ markedly in man and cats. I have no information about the mosquito-catching abilities of the monkeys in Malaya.

"The questions of site selection and the effect of repeated reinfection raised by Professor Bertram are under investigation. Adult *W. malayi* have always been found in the lymphatic vessels usually in association with a lymph gland. In the naturally infected animals adult worms have been recovered from the vessels associated with all the major groups of lymph glands. In the experimentally infected animals the majority of worms were found in vessels associated with the groups of glands close to the site of inoculation.

"We are already investigating the possibility of there being two varieties of *W. malayi* as suggested by Sir Philip Manson-Bahr. The microfilariae of *W. malayi* in the human carriers from Kedah, N. Malaya, have a strictly nocturnal periodicity, do not develop readily in *M. longipalpis*, which is the common vector in E. Pahang, but will develop in *Anopheles barbirostris*. The microfilariae in the human carriers from E. Pahang show a reduced nocturnal periodicity and develop readily in *M. longipalpis* but not in *A. barbirostris*. The microfilariae from Kedah are slightly but significantly longer than those from E. Pahang; empty sheaths are a marked feature of blood films from Kedah but are very rare in blood films from E. Pahang. We have been able to transmit the infection from carriers from Kedah into two cats." *W. E. Kershaw*

Lee, R. D. & Parmelee, W. E. **Thelaziasis in Man.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 427–8, 1 fig. [16 refs.]

Infection of man with the eye worm *Thelazia* is believed to be accidental and the authors refer to the paucity of cases reported. They briefly review 12 such cases from the literature, and then give data on 3 new cases from the western United States. 9 of the original 12 were from Asia and the worms were identified as *Thelazia callipaeda*. The 3 from North America were *T. californiensis*, which seems to be found most frequently in deer and dogs.

The worms are whitish, threadlike, about 1 inch long and glide across the surface of the eye with a serpentine movement. Symptoms include lachrymation, conjunctivitis, corneal scarring, opacity and occasionally blindness.

The 3 new cases, all from California, were as follows:—

(1) A desert recluse of 70 had come on 3 occasions in 5 years to have worms removed from the eyes of his shepherd dog. On one occasion he asked for worms to be removed from his own eyes. Neither man nor dog seemed to be particularly disturbed by the worms but both had excessive lachrymation.

(2) About half a dozen worms were removed from the eye of a patient who had been hunting deer in the Sierra Nevada mountains. He had conjunctivitis which cleared soon after the worms had been removed. He had washed his face in brackish water which might have been infected by animals but the authors believe that it is more likely that an arthropod vector was concerned.

(3) A woman of 55 who lived at 3,000 feet in the Sierra Nevada region had a red eye, with a feeling of a foreign body in it, for about a month. There was marked follicular hypertrophy of the tarsal conjunctiva. When the upper lid was everted a round worm was found in the upper cul-de-sac and this was identified as *T. californiensis*.

The authors suggest that these infections are commoner than might be suspected and they invite information from readers who may have seen cases of thelaziasis. They write from the School of Tropical and Preventive Medicine, College of Medical Evangelists, Loma Linda, California.

H. J. O'D. Burke-Gaffney

Duke, B. O. L. & Wijers, D. J. B. **Studies on Loiasis in Monkeys. I.—The Relationship between Human and Simian *Loa* in the Rain-Forest Zone of the British Cameroons.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 158–75, 4 figs. [11 refs.]

"The relationship between human and monkey infections with *Loa* is complex, and the findings described in this paper relate only to the rain-forest zone of the British Cameroons, where all the observations were made. They are by no means necessarily applicable to other environments.

" Species of simian *Loa* have been described by Treadgold (1920) in *Papio cynocephalus* from French Guinea, and by Vogel (1927) in *Ateles paniscus* of South American origin. Sandground (1936) found *Loa* worms in *Cercocebus albigena johnstoni* from the Belgian Congo, but he considered that the morphological differences between these worms and *L. loa* from man were insufficient to warrant their being given specific rank. Subsequently, Rodhain and Van den Berghe (1939) described a new genus, *Paraloa*, from chimpanzees in the Belgian Congo.

" In the rain-forest zone of the British Cameroons, in the neighbourhood of Kumba, infections with a form of *Loa* were found by Gordon *et al.* (1950) in three common species of monkey, *Mandrillus leucophaeus*, *Cercopithecus nictitans martini* and *C. mona mona*; subsequently, on one occasion the rare *C. preussi* also was found infected (Duke, *unpublished*). These discoveries raised the problem of whether the monkey population constituted a reservoir for the human parasite, and whether the same species of *Chrysops* were responsible for the transmission of loiasis among monkeys as among the human population."

The authors' summary is as follows:—

" A comparative study is made of the microfilariae and adult worms of human and simian *Loa* in various hosts in the Cameroons rain-forest, and it is shown that:

" 1. Infections with a form of *Loa* are found in *Mandrillus leucophaeus*, *Cercopithecus nictitans martini*, *C. mona mona* and *C. preussi*. The parasites are of large somatic size, the microfilariae exhibit a nocturnal periodicity, and the vectors are the crepuscular canopy-dwelling *Chrysops langi* and *C. centurionis*.

" 2. *Loa loa* from man can be transmitted experimentally by *C. silacea* to *M. leucophaeus*, the mature parasites being of small somatic size and the microfilariae maintaining their diurnal periodicity.

" 3. Under natural conditions the transmission of *L. loa* from man to monkey takes place extremely rarely, and the monkey population is of no practical importance as a reservoir of human loiasis.

" 4. The human and simian parasites are at an early stage of radiative evolution in separate host-vector complexes, between which parasite interchange is minimal. These complexes comprise *L. loa*, man, *C. silacea* and *C. dimidiata* (Bombe form) on the one hand, and simian *Loa*, monkeys, *C. langi* and *C. centurionis* on the other."

[For the experimental details the original should be consulted.]

W. E. Kershaw

Van Bogaert, L., Dubois, A., Janssens, P. G., Radermecker, J., Tverdy, G. & Wanson, M. **Encephalitis in Loa-loa Filariasis.** Reprinted from *J. Neurol. Neurosurg. Psychiat.* 1955, v. 18, 103–19, 12 figs. [36 refs.]

The literature concerning the suggested neurological manifestations of filariasis is reviewed and the 6 cases in which microfilariae of any species

have been found in the cerebrospinal fluid [see, for example, this *Bulletin*, 1953, v. 50, 52] are recorded [in 2 of these cases microfilariae were found in blood-stained fluid and one other was an advanced case of trypanosomiasis].

A man, infected with *Loa loa*, with a variety of complaints, loss of weight, dyspepsia and repeated bouts of dysentery, was treated with diethylcarbamazine when his condition deteriorated and he became slowly semi-comatose, dying some days later. The microfilariae of *L. loa* were found in the cerebrospinal fluid. The diagnosis of acute meningoencephalitis, "reminiscent of the so-called post-salvarsan encephalitis" was made. The histology is given in detail.

The authors suggest that this fulminant allergic reaction was precipitated by lytic chemotherapy. *W. E. Kershaw*

Ch'en, Ku-Hsing, Wang, Shao-Ping, Yü, Mao-Hua & Liu, Teh-Shan. **Gongylonema Infestation. A Case Report with Morphologic Study.** *Chinese Med. J.* Peking. 1958, Sept., v. 77, No. 3, 254–6, 4 figs.

See this *Bulletin*, 1956, v. 53, 92.

Lämmler, G. Die Chemotherapie der Trichuriasis. Untersuchungen an experimentell mit *Trichuris vulpis* infizierten Hunden. [**Chemotherapy of *Trichuris vulpis* Infection in the Experimentally Infected Dog**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 204–12. [Numerous refs.]

The English summary appended to the paper is as follows:—

"'Viasept' (p-glycolylamino-phenyl-arsonic bismuth) proved an effective and compatible anthelmintic for the canine whipworm (*Trichuris vulpis*) when orally administered in the course of a four-days' treatment, the total dosage being 300–340 mgs/kg.

"As the canine whipworm infection can be considered comparable to human trichuriasis (*Trichuris trichiura*), thus being of great value for testing anthelmintics, the experiments with dogs are described in detail and the relevant literature is discussed."

Hannah, E. E. **The Neurotoxic Effect of Piperazine. Report of a Case.** *New Zealand Med. J.* 1958, Aug., v. 57, No. 320, 351–2.

"A case of piperazine intoxication presenting with neurological symptoms is reported. Possible causes of accidental overdosage are discussed."

[See this *Bulletin*, 1954, v. 51, 423.]

Patzelt, O., Berner, Thea & Wunderlich, Margarete. Beitrag zur Klinik der Trichinose. [**Clinical Aspects of Trichinosis**] *Ztschr. f. ärztl. Fortbildung.* 1958, Mar. 15, v. 52, No. 6, 217–28, 8 figs. [52 refs.]

This article is a contribution to an issue commemorating the 70th birthday of Professor Brinkmann, Director of the Klinik des Bezirks-krankenhauses "Heinrich Braun" in Zwickau (Saxony). It consists of a clinical account of an outbreak of infection with *Trichinella spiralis* of mild or moderate severity with no deaths, which occurred in mid-1955. A review of the indirect methods of diagnosis is given together with the biochemical changes, including the results of paper electrophoresis. Electrocardiograms are shown throughout the infection. The study is based on 166 patients seen by the authors. *W. E. Kershaw*

Weimer, H. E., Markell, E. K. & Nishihara, H. **Serum Glycoprotein Studies in Experimental Trichinosis.** *Exper. Parasit.* New York. 1958, Sept., v. 7, No. 5, 468–76. [23 refs.]

DEFICIENCY DISEASES

Schulz, K. H. **The Diet and Food Preparation for Labourers in Heavy Industry on Witwatersrand Goldmines.** *J. Trop. Med. & Hyg.* 1958, June & July, v. 61, Nos. 6 & 7, 148–56; 177–86, 6 figs. [13 refs.]

Homawala, K. S. **Rapid Nutrition cum Dietetic Survey of Twelve Wadis in Karjat Taluka.** *Indian J. Child Health.* 1958, Aug., v. 7, No. 8, 531–42, 1 map.

South Pacific Commission. Nouméa, New Caledonia. **Nutrition and the Papuan Child. A Study in Human Welfare** [Oomen, H. A. P. C. & Malcolm, S. H.]. *Technical Paper No. 118.* 1958, Apr., vi + 146 mimeographed pp., numerous illustrations. [Numerous refs.]

Food and Agriculture Organization of the United Nations. **Report to the Government of Libya on Nutrition** [Ferro-Luzzi, G.]. 47 mimeographed pp., 5 charts. [17 refs.] Report No. 920. FAO/58/7/5176. 1958: Rome.

The mangrove swamps of the Pacific and the deserts of Libya might appear to have little in common. Yet these two reports can be reviewed

together, for each is concerned with people living on the fringes of civilizations in areas of the world still geographically remote and their daily lives almost completely unaffected by modern industry and scientific discoveries. The primitive life, as these reports show, is always hard and often cruel. The attempts now made by international organizations and others to help such people to get the benefits which have become available to man through science, present a new problem in education.

Both reports are written by experienced nutritionists, able to assess local conditions, agricultural and clinical, and to describe them well. Each will be an invaluable document for administrative purposes to local governments or foreign missions attempting to assist the people. Yet each is of wide interest and any student of human biology can read both with profit and pleasure.

A few generalizations can perhaps be drawn. Primitive people are more likely to suffer from a lack of calories and protein than from a lack of vitamins. These deficiencies affect the adult men less than the women and children. Growth and development are delayed and adult size diminished. Because of the poor environmental conditions, infectious diseases are common and resistance to them is probably lowered by an inadequate diet. The classical deficiency diseases are seldom seen among primitive people; but both in Libya and Papua rickets is not uncommon, despite the abundant sunshine. This is due to the custom of mothers keeping their children indoors.

Breast feeding for a long period, up to two years, is a custom which is valuable and not to be discouraged. Earlier weaning is only desirable when there is an ample alternative supply of milk. For a child during the second year of life some small supply of animal protein in the diet is highly desirable and this can be provided by the mother, but breast milk can supply only a fraction of the calories needed. The supplementary foods given are usually unsatisfactory, and here is the need for education.

Education is discussed at length in both reports and is clearly the key to better levels of nutrition and health. A good maternity and child health service would appear to be the most valuable educational organization that can be imported among primitive people.

There are interesting accounts of the ingenuity with which food can be obtained. In the Fezzan area of Libya, a small crustacean, commonly called a *duda* (a worm), provides a valuable additional source of animal protein. The *duda* are gathered by village women with primitive nets from the lakes in the oasis. The algae in these lakes provide another useful food, *danga*.

Oomen and Malcolm give good records of lactation recommencing long after the previous child has been weaned. After the death of her daughter, a grandmother was able to suckle her grandchild, despite an interval of 14 years since her last lactation. The physiological mechanism of this is an interesting problem.

Both reports are full of information essential for anyone working in

the field of medicine or social science in Libya or Papua, but their general interest gives them a wide appeal. *R. Passmore*

Symonds, B. E. R. **Clinical Studies on South Trinidadian Children. (I) Fatal Malnutrition.** *J. Trop. Pediatrics.* London. 1958, Sept., v. 4, No. 2, 75–82, 5 figs.

The infant mortality rate in Trinidad is 67·9 and is not showing a steady decline. In the capital, Port of Spain, it is 45.

Although there is a heavy death rate in the early months of life, relatively few of these children are brought for treatment, and many are not even registered. There is a description of various cases of malnutrition. An overwhelming proportion of deaths in children under one year old are due to or are complicated by malnutrition. 79% of deaths from malnutrition occurred in the first 7 months. Findings are shown in a table and in figures related to 163 infants who died in 1955–57 and in whom autopsy was carried out. Much of this malnutrition is due to artificial feeding which is becoming more prevalent.

[The author suggests that these conditions need further "study". It would appear that what are really needed are organization and action.]

Cicely D. Williams

Chakravarty, A., Sur, A. M. & Kandelwal, M. K. **Scurvy. A Preliminary Report.** *Indian J. Child Health.* 1958, Aug., v. 7, No. 8, 521–30, 7 figs. [12 refs.]

This paper reports 28 cases of infantile scurvy in Nagpur, a great orange-growing centre, but poverty and ignorance are the fundamental causes. In 27 patients there was the characteristic tenderness over the lower limbs. Pseudo-paralysis with inability to bear weight was present in 26. This was often unilateral and many of the children were referred to the authors as suffering from poliomyelitis. 25 of the children were anaemic, 4 severely so. The characteristic radiological findings were most useful in diagnosis.

This clear and full clinical account indicates that infantile scurvy may be commoner in India than is generally supposed. The authors stress the importance of combating the ignorance regarding infant feeding and the need for proper health education. The cheapest source of vitamin C locally is ammala [the Indian gooseberry, *Phyllanthus emblica*, Linn] which can be stored in a dry powdered form, and its use is recommended.

R. Passmore

Carr, W. R. **The Baobab Tree: a Good Source of Ascorbic Acid.** *Central African J. of Med.* 1958, Sept., v. 4, No. 9, 372–4.

Ferro-Luzzi, G. Le forme atipiche nervose della malnutrizione "B". [**Atypical Nervous Manifestations of Vitamin B Deficiency**] Reprinted from *Dietologia e Dietoterapia*. 1958, v. 2, No. 1, 9 pp. English summary.

From the Institute of Nutrition and Dietetics at Rome the author discusses diseases of the nervous system due to deficiency of one or more factors of the vitamin B complex in the light of his experiences in Eritrea.

Pellagra is practically unknown among the indigenous people as is also pernicious anaemia. Retrobulbar optic neuritis is fairly frequent though it is not considered to be due to deficiency but, in the 50% not caused by syphilis, to a viral encephalitis of unknown origin.

He then describes a syndrome which he calls tropical pseudo-tabes, found in Eritrea from 1940 to 1943. 32 persons, all Europeans and mostly males, were affected with polyneuritis of the upper and lower limbs, oedema, definite signs of cardiac damage and alterations in the blood sugar curve after glucose loading. The condition was not classical beriberi, or polyneuritis due to any known cause. The course was slow; no case was fatal; a toxic aetiology could not be excluded, but the disease disappeared when the abnormal conditions in the country caused by the war ceased. Treatment with vitamin B did not help.

In Eritrea subacute combined sclerosis seems to affect only the indigenous people whose diet is deficient, though in contrast with the conditions described by Spillane (*Nutritional Disorders of the Nervous System*, 1947. Edinburgh: E. S. Livingstone, Ltd.), the parapareses were of the spastic type, disturbances of sensibility were not prominent, and signs of damage of the posterior cords were as a rule only slight.

The author summarizes by stating that in his opinion the primary spastic-paretic and malnutrition syndromes seemed to be related as the cases were always in patients suffering from malnutrition, especially the vitamin deficiency diseases. He considers however that the pathogenesis of the paraplegia is still very obscure, although it may perhaps be of dietetic origin. *W. K. Dunscombe*

Salamon, T. **Enlarged Parotids and Pellagra.** *J. Trop. Med. & Hyg.* 1958, Oct., v. 61, No. 10, 253–9, 6 figs. [23 refs.]

During the spring and summer of 1957 47 patients with pellagra were seen in a dermatological unit in Yugoslavia, of whom 9 had symmetrical, non-inflammatory, painless, chronic enlargement of the parotids. In 5 of these patients biopsy of the glands was carried out. The following points were noted. All, except the eldest, were undernourished, had cutaneous and mucous membrane symptoms of pellagra, and had painless, afebrile, mostly symmetrical, enlargement of the parotids. The biopsy specimens showed no pathological changes in 4 cases, but in the fifth there was an interstitial lymphocytic infiltration. All specimens showed numerous

secretary granules in the acini, suggesting parotid hyperfunction. The serum gamma globulin was increased in every case. Otherwise, clinical and pathological investigations were negative. In all patients the parotids were still enlarged after an average stay in hospital of 27 days.

It appears that enlargement of the parotids is not necessarily a symptom of severe pellagra. Two hypotheses are put forward. One hypothesis is that the enlargement may be caused by external irritation due to dry food, as proposed by Erlich (*Presse Méd.*, 1922, v. 30, 138). McCance and his associates (*Med. Res. Council Spec. Rep. Ser. No.* 275, 1951, p. 135) suggest that such enlargement may be part of the body's reaction to a nutritional surplus after a prolonged period of malnutrition. Enlargement of the parotids may therefore be a symptom of undernutrition. Other workers consider that enlargement of the parotids due to malnutrition is a manifestation of disturbed internal secretion of these glands.

These hypotheses seem unacceptable and one essential possibility remains: namely, the stimulation of function by nervous excitation, as the function of the salivary glands depends upon parasympathetic innervation.

3 cases of pellagra occurred in children under 10 and all had concomitant enlargement of the parotids which suggests that these glands in children are particularly susceptible to insufficient nutrition.

Philip Manson-Bahr

Henington, V. M., Caroe, E., Derbes, V. & Kennedy, B. **Kwashiorkor. Report of four Cases from Louisiana.** *Arch. Dermat.* 1958, Aug., v. 78, No. 2, 157–68. [16 refs.] Discussion 168–70.

"Kwashiorkor, a protein-deficiency disease which was described definitively in 1933, was first observed in equatorial Africa and has since been reported in various parts of Asia, Europe, and Central and South Africa. The four cases reported in this communication from Charity Hospital of Louisiana at New Orleans are believed to be the first reported in the United States.

"Two of these cases, although the patients were acutely ill, were apparently milder than the variety of disease observed in Africa. The other two cases represent the forme fruste variety. All of the patients responded to correct (high-protein) therapy, but in one instance it was apparently instituted after certain irreversible changes had occurred.

"It is believed that other patients in the United States are suffering from kwashiorkor, and it is hoped that this communication will call attention to the importance of recognizing and treating them."

[All these cases belonged to the chronic type of disease and were complicated by other deficiencies as well as that of protein. These are some of the first cases of kwashiorkor to be described in the U.S.A.]

Cicely D. Williams

Lahey, M. E., Behar, M., Viteri, F. & Scrimshaw, N. S. **Values for Copper, Iron and Iron-Binding Capacity in the Serum in Kwashiorkor.** *Pediatrics.* Springfield, Ill. 1958, July, v. 22, No. 1, Pt. 1, 72–9. [32 refs.]

The main findings can be summarized as follows:

	Mean value for 10 children with kwashiorkor	Normal adult value
Serum copper (μgm./100 ml.)	65	114
Serum iron (μgm./100 ml.)	36	105
Total iron-binding capacity (μgm./100 ml.)	79	347
Saturation (%)	65	30

The authors discuss these values for copper and iron in the serum of children with kwashiorkor in a critical manner and in relation to similar abnormalities in experimental animals. The children were all anaemic, but did not have the microcytosis and hypochromia characteristic of iron deficiency in man and copper deficiency in swine. It is concluded that the changes are more likely to be secondary to an inadequate protein intake than directly attributable to deficiencies of minerals in the diet.

R. Passmore

Atta, Susan B. G. O. **Intraperitoneal Blood Transfusion in Children in Accra with special reference to the Treatment of Kwashiorkor.** *Arch. Dis. in Childhood.* 1958, June, v. 33, No. 169, 202–4, 2 figs.

Details are given of the technique for intraperitoneal transfusion of blood in infants. 43 transfusions were given to 36 children suffering from kwashiorkor. The amount usually given was 20 ml./lb. of body weight. Clinically the infants appeared to benefit immensely from the transfusion and there were satisfactory rises of haemoglobin. Mild reactions (abdominal distension and pyrexia) were frequent, but only one child had a severe reaction.

R. Passmore

Lefrou, G. & Michard, V. Étude clinique et histologique sur la stéatose hépatique des chimpanzés morts en captivité à l'Institut Pasteur de Kindia (1950–1956). [**Clinical and Histological Study of Fatal Hepatic Steatosis in Chimpanzees kept at the Pasteur Institute, Kindia (1950–1956)**] *Ann. Inst. Pasteur.* 1958, Sept., v. 95, No. 3, 314–25.

There is a high death rate among young chimpanzees when brought into captivity. Diseases of the lungs and of the intestines are the most frequent cause. Fatty degeneration in the liver is commonly found, whatever the cause of death. It is suggested therefore that the young chimpanzee would be a suitable animal for the experimental study of

kwashiorkor. However, many of the animals had survived in captivity for several months before death and their diet in the institute, as recorded, appeared satisfactory, so that factors other than a defective diet may have been in part responsible for the liver changes. *R. Passmore*

HAEMATOLOGY

LICHTMAN, H. C. **Current Status of Therapy in Anemias.** [Report to the Council on Drugs (KAUTZ, H. D., Secretary).] *J. Amer. Med. Ass.* 1958, June 7, v. 167, No. 6, 735–41.

Anaemia results from increased blood loss, excessive blood destruction, impaired blood cell formation, or a combination of these mechanisms. It is most efficiently corrected when the pathological processes causing it are determined and treated.

A useful aetiological classification of anaemias is given in the following Table:—

I. Loss of blood
  A. Acute
  B. Chronic
II. Excessive Destruction of Erythrocytes
  A. Intracorpuscular defect
  B. Extracorpuscular defect
III. Impaired Production of Erythrocytes
  A. Deficiency of substances necessary for erythropoiesis
    1. Iron
    2. Cyanocobalamin (vitamin B12)
    3. Folic acid
    4. Protein
    5. Ascorbic acid (vitamin C)
    6. Other vitamins
    7. Trace elements
  B. Congenital defects in erythropoiesis
    1. Abnormal haemoglobin diseases
    2. Thalassaemia
    3. Congenital spherocytosis
  C. Acquired defects in erythropoiesis
    1. Infection
    2. Renal Disease and other chronic disease
    3. Noxious agents, lead, irradiation, drugs
    4. Endocrine abnormalities
    5. Bone marrow, replacements or infiltration
    6. Splenic disorders

This classification is not extensively used in the discussion, which is based rather on the prevailing blood pictures. Some confusion results from this duality of presentation. The anaemia patterns discussed are: microcytic hypochromic, macrocytic (megaloblastic and normoblastic) and normochromic normocytic (including the aetiological group " due to bone marrow hypofunction ").

Microcytic hypochromic anaemia exists when the mean corpuscular volume (MCV) is below 80 cu.μ and the mean corpuscular haemoglobin (MCH) is less than 30%. Included in this group of anaemias are all those which respond to iron therapy, for example, those arising from chronic blood loss and dietary iron deficiency. The anaemia of thalassaemia, which arises from a combination of inadequate haemoglobin production and excessive haemolysis, but which does not respond to iron therapy, is included.

Treatment with iron is discussed. Ferrous salts (for example, the sulphate in doses of 1·0 gm. per day) are usually adequate. No advantage is gained by the addition of trace metals or vitamins. Gastric irritation may be avoided by smaller doses gradually increased, or by substituting ferrous gluconate. Where parenteral administration is necessary, intramuscular injections of iron-dextran complexes are satisfactory. Intravenous injection of saccharated iron oxide may also be given but may be toxic. The dose of parenteral iron must be carefully calculated to avoid excessive concentrations in the tissues. Calculation is made from the deficit between the prevailing haemoglobin values and the normal values, since each 1·0 gm. of haemoglobin requires 3·4 mgm. of iron. An additional 20% is given to reconstitute the tissue iron stores.

Macrocytic anaemia exists when the MCV exceeds 94 cu.μ. The two main groups are those associated with megaloblastic erythroid precursors and those associated with normoblastic.

The megaloblastic anaemias are characterized by macrocytic normochromic erythrocytes, megaloblastic erythropoiesis, leucopenia, thrombocytopenia and, depending on the pathogenesis, dramatic response to specific anti-anaemic therapy. Pernicious anaemia is considered as an illustration. Cyanocobalamin is the drug of choice in intramuscular doses of 30 μgm. daily until a satisfactory response is obtained, *i.e.*, usually 2 weeks. Maintenance therapy is required for life (45 to 60 μgm. intramuscularly at intervals of 4 to 6 weeks). Liver extracts are also effective, but not more so. Folic acid is contraindicated for pernicious anaemia but is useful in megaloblastic anaemia of pregnancy, tropical and nutritional macrocytic anaemias and " some cases " of sprue [presumably those with additional nutritional macrocytic anaemia].

Normoblastic macrocytic anaemias are usually of secondary origin, for example, in scurvy and myxoedema. The disorder is not primarily localized to the haemopoietic system; there are no megaloblastic changes in the marrow. One form is seen in chronic liver disease. The cells are

large and thin and are associated with target cells. Chronic blood loss may lead to a hypochromic state in which iron is of some help.

Treatment in some cases, for instance in scurvy, is specific. In other examples it is unsatisfactory.

Normocyctic normochromic anaemias arise from acute blood loss, *i.e.*, from haemorrhage or acute lysis arising from defects in the erythrocytes or their environment. Bone marrow hypofunction, arising from chemical or metabolic poisoning, cellular invasion, and from hormonal disturbances (hypersplenism is included here), also leads to this pattern of anaemia.

Treatment includes transfusion of blood. In the management of haemolytic anaemias the basic factors are corticotrophin or adrenal corticosteroids, splenectomy, transfusion and removal of adverse environmental factors (parasites, bacteria, chemical agents, etc.).

B. G. Maegraith

Demarchi, M. **Effect of Dietary Protein on Blood Regeneration of Anemic Patients suffering from Parasitic Infestation.** *Amer. J. Clin. Nutrition.* 1958, July–Aug., v. 6, No. 4, 415–21.

This paper is based on a study of rates of blood regeneration in 53 patients treated for anaemia in hospital in Baghdad. The anaemias were of mixed origin. Most of the patients were infected with *Ancylostoma* and some with *Schistosoma*. One group were given a diet containing 64 gm. protein with a caloric value of 3,200 and the other group a diet containing 102·5 gm. of protein with a caloric value of 3,440. Rates of haemoglobin regeneration were higher in the group receiving the larger protein intake. This paper provides convincing evidence of the importance of an adequate intake of protein for the rapid regeneration of haemoglobin.

R. Passmore

Aksoy, M., Ikin, Elizabeth W., Mourant, A. E. & Lehmann, H. **Blood Groups, Haemoglobins, and Thalassaemia in Turks in Southern Turkey and Eti-Turks.** *Brit. Med. J.* 1958, Oct. 18, 937–9, 1 fig. [30 refs.]

The sickle-cell gene occurs in a small focus near Mersin in southern Turkey among the Eti-Turks, who are an Arab-speaking group [this *Bulletin*, 1955, v. 52, 571; 1957, v. 54, 1229, 1232]. This finding led to a survey in which 138 Eti-Turks—some of them related—and 240 unrelated neighbouring Turks contributed blood for analysis. 108 samples from each group were tested for the antigens, A_1, A_2, B, M, N, S, C, C^w, c, D, D^u, E, e, Lu^a, K, and Fy^a. The results are given in 7 tables. Both groups were found to share the characteristics of the peoples of south and south-east Europe rather than of Asia, and African

characteristics were conspicuously absent. Sickling, however, was absent in the Turks surveyed, while it was common among the Eti-Turks, to the extent of perhaps 10% in the whole community. A remote introduction of the sickling gene to this community may, under the prevalence of malaria, have caused the present incidence. Thalassaemia occurs in both communities; Hb-E occurs sporadically among Eti-Turks, and Hb-D was found once among the 240 Turks. *Alan B. Raper*

Clearkin, P. A. **A Blood Transfusion Service in Cyprus with Notes on the ABO Groups of Cypriots.** *Brit. Med. J.* 1958, Oct. 18, 939–42.

After initial difficulties, of the sort usually encountered among a public unused to the idea, a blood bank was established in Nicosia in 1953. The principle that made this possible will be of general interest: "The system employed consisted in laying the onus for providing donors on the medical practitioners who wished to use the services of the bank. Each medical officer in charge of a ward in the hospital was required to open an account by supplying two or more donors, and for each two donors he was credited with one bottle of blood. He was allowed to draw blood from the bank up to the extent of his credit, but overdrafts were permitted at the discretion of the director, or, alternatively, a ward which was overdrawn could borrow from another whose credit was good. . . . Donors were drawn from friends and relatives of patients who required a transfusion or who were about to undergo a major operation. Accounts were rendered to each ward every Monday morning."

From this highly practical section the author turns to an investigation that sprang from the bank's experience that both group O and Rh-negative donors were fewer than expected. Using only anti-D serum, he found that "In a series of 2,000 tests the Rh frequency was 2·5% in Greek-speaking Cypriots and 3·2% in Turkish-speaking Cypriots. Thus both communities agree in having the lowest Rh frequency in the Mediterranean basin". A more extensive survey of the ABO groups was made throughout the island. This showed that the A, B, and O gene frequencies were, for 7,363 Greek Cypriots 0·311, 0·094, and 0·595; and for 2,304 Turkish Cypriots 0·315, 0·12, and 0·575, respectively. Comparison of these results with published data from the surrounding mainland shows that in their ABO genetic content the Cypriots resemble the Greeks much less than they do the European Turks, Anatolians, and Lebanese. A brief summary of the island's long and stormy history reveals the extent to which population interchange with the adjoining Asiatic mainland occurred, and probably explains why the blood groups of the Cypriots of both linguistic groups show affinities with those of the coasts of Asia rather than of Greece. *Alan B. Raper*

Shapiro, M. **"False" Sickle Cells.** [Correspondence.] *Lancet.* 1958, Nov. 1, 958–9, 3 figs.

"Spiculated" cells are described, closely resembling sickled cells, which were demonstrated in blood from 17 of 18 females and occasionally from 6 males, all of purely Western European origin and showing no abnormal haemoglobin on electrophoretic examination. The technique for preparing these cells was as follows. Wet sealed 2% blood suspensions in 1% Normosal (Sächsisches Serumwerk, Dresden) were incubated and spicules were seen within 8 to 24 hours. They appeared first near the margin of the preparation and were later on seen to spread towards the centre. The spicules were due to the formation within the cells of one or more straight, highly refractile filaments, 15–20 μ in length. These filaments stretched the cell envelope and distorted the cell shape. When there were several such filaments criss-crossing through the cell body, the round shape became polygonal and the appearance was that of the holly-leaf cells seen when sickle-cells are incubated with reducing agents. The subjects were examined twice weekly for 11 consecutive weeks. In the women there was a correlation between spicule formation and menstrual cycle. The spicule formation was most pronounced just before menstruation and disappeared rapidly after the onset of bleeding. Spiculated cells were also prepared from the blood of cows, pigs, sheep, goats, and other vertebrates, and one illustration shows the phenomenon in eel cells.

[It is becoming increasingly obvious that sickling is a quantitative and not a qualitative process, and that microscopic sickling may under certain conditions occur when haemoglobins other than haemoglobin S form tactoids or crystals within the cell. Haemoglobin S can of course easily be demonstrated by electrophoresis. Incidentally the author includes the "46%" incidence of sickling in pygmoids from East Africa in the list of surveys where results for sickling incidence were presumably based on false sickling. This contention is repudiated by Lehmann and Raper in a letter to *Lancet*, 1958, Nov. 8, 1011.] *H. Lehmann*

Delbrouck, J. Contribution à la génétique de la sicklémie. Maintien de la fréquence élevée de sicklémie au Congo belge. [**Contribution to the Genetics of Sicklaemia. Maintenance of the High Frequency of Sicklaemia in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 103–34, 1 chart. [Numerous refs.]

A review of the literature on sickling and malaria forms the introduction to this paper. The main part is devoted to the results of a study of more than 11,000 Mongo living in and near Coquilhatville in the Belgian Congo. Of 5,360 males 1,266 were found to be sickle-cell trait carriers (23·6%) and of 5,928 females 1,463 (24·7%). There were only 5 cases of sickle-cell anaemia among 5,294 people aged 10–40 years. Survival of sickle-

cell homozygotes is therefore not considered as playing a significant part in maintaining the sickling gene at a high frequency in this population. The incidence of the trait was slightly lower in children aged 6 months to 3 years than in children aged 3–10 years. After the exclusion of sickle-cell anaemia cases (homozygotes) there were in the younger group 290 sicklers among 1,275 (22·75%), and in the older group 461 of 1,967 (23·44%). In the 10–20 years age-group the incidence of sicklers was 452 of 1,890 (23·92%). The conclusion is drawn that at a very early age the chance of survival is slightly better for sicklers than for non-sicklers. There was a considerable rise in sickling frequency after the age of 40. In the 30–40 years age-group the incidence was 372 of 1,579 (23·56%) and in the 40–50 years age-group 395 of 1,487 (26·56%). However, this advantage in survival after the main reproductive age could hardly have an important effect on the maintenance of the high sickling frequency.

The influence of sickling on the infection with *Plasmodium falciparum* could be confirmed. It was noted in children under the age of 10 but not afterwards. Of 34 malarial children under 10 years of age 3 (8·8%) were sicklers and all 3 were only mildly infected (+); the remaining 31 children were non-sicklers (92%) and the proportions of the degrees of parasitaemia described as +, ++, and +++ were 42, 42, and 16% respectively. On the other hand, above the age of 10 no such differences between sicklers and non-sicklers were observed. Of 76 malarial patients 13 (18%) were sicklers and the proportions of +, ++, and +++ infections were 61·5 : 23 : 15·5. The 63 non-sicklers (82%) showed a very similar distribution, namely 63·5 : 28·5 : 8.

There was no relation between sickling and tuberculosis, and none was seen when the overall figures were considered for sickling and leprosy. However, there was a lower incidence than expected of sicklers among the patients with tuberculoid leprosy and a correspondingly higher one in patients with lepromatous lesions. In 657 leprosy patients the sickling incidence was 23·74%; 469 had tuberculoid lesions and the proportion of sicklers among them was 20·47%; in the remainder with lepromatous infections the sickling incidence was 31·91%. [The author is apparently not aware of an investigation by André and André-Gadras (this *Bulletin*, 1958, v. 55, 51), where the opposite was noted—a lower incidence of sickling in patients with lepromatous leprosy.]

[The author is also apparently unaware of a publication by Livingstone (*ibid.*, 1957, v. 54, 785) which is of considerable interest in connexion with the data on the influence of sickling on fecundity in the present paper. Livingstone pointed out that the advanced stages of development of *Plasmodium falciparum* are not seen in the peripheral blood. As the parasite grows the red cell in which it is contained adheres to the walls of blood vessels in the internal organs where it would give up oxygen. A sickle cell would under these conditions tend to alter its shape and therefore be more easily ingested by phagocytes than the non-sickling cell. Livingstone pointed out that parasitized sickle cells should therefore

find it less easy to survive in the placenta than infected non-sickling cells. This should confer a notable advantage on sickling mothers who would have a greater number of live born children—at least half of them sicklers—than non-sickling mothers. Livingstone also remarked on the scarcity of data on this problem.] The present paper advances knowledge considerably. In 3,562 Mongo women aged 20 years and more, 5,725 successfully completed pregnancies were counted, *i.e.* the fecundity index was 160·7. When the women were divided into 916 sicklers and 2,646 non-sicklers it was found that the first had 1,551 children instead of the expected 1,472, and that their fecundity index was therefore 169·3 instead of 160·7. Correspondingly, the non-sickling women had 4·174 children with a fecundity index of 157·7. This difference between the fecundity of sickling and non-sickling mothers is statistically significant ($P < 0{\cdot}02$). The difference in fecundity was more marked in the women above the age of 30 than in those aged 20–30 years. In 1,209 women aged 20–30 the fecundity index was 128·4, and when they were subdivided into 290 sicklers and 919 non-sicklers the indices were respectively 125·9 and 129·2 ($P > 0{\cdot}65$). However, in the older women the index for 2,353 was 177·3, and, of these, for 626 sicklers 189·5, and for 1,727 non-sicklers 173·0 ($P < 0{\cdot}01$).

The author discusses earlier work by Allard [*ibid.*, 1957, v. 54, 746] where it was claimed that in the Mongo population sickling fathers had more children than non-sickling fathers. These results had been only suggestive and were not statistically significant. By treating Allard's data similarly to his own the author shows that there seems to be in fact a statistically significant higher index for fecundity for sickling fathers when only the 40–50 years age-group is considered.

The higher fecundity of the sickling women above the age of 30 must, according to the author, play a major part in the maintenance of the sickling gene at high frequency and should balance to a considerable extent the loss of sickle-cell genes by death of homozygotes before the age of reproduction—about 40%. *H. Lehmann*

Wassermann, H. P. Sekelselanemie. 'N studie van 'n kleurlingfamilie (4 pasiënte). [**A Study of Sickle-Cell Anaemia in a Half Caste Family (4 patients)**] *South African Med. J.* 1958, Sept. 27, v. 32, No. 39, 953–6, 8 figs. [10 refs.] English summary.

Went, L. N. & MacIver, J. E. **Sickle-Cell Anaemia in Adults and its Differentiation from Sickle-Cell Thalassaemia.** *Lancet.* 1958, Oct. 18, 824–6, 2 figs. [14 refs.]

In Jamaica in the last 2 years the authors investigated 114 cases of sickle-cell anaemia, all acceptable by clinical, haematological, and electrophoretic standards. 49 patients were over the age of 15 years (and

reference to a contemporary paper by the authors, giving fuller details of the same cases [below] shows that the oldest subject had attained 62 years). 48 of the 212 parents were examined. All these possessed sickling red cells, and the 9 children borne by 5 of the female patients were also carriers of the trait. The authors conclude that all their 114 patients were of SS genotype.

Sickle-cell anaemia in Jamaica differs from the disease in Africa in the higher age of the subjects and in its lower mortality; the authors saw only 3 deaths among their patients in 2 years. They think African patients may die earlier from environmental causes, and that the disease is seen in a more unmodified form in the West Indies.

The sickle-cell anaemia patients were compared with 11 patients with sickle-cell thalassaemia. In the latter patients the disease was distinguished haematologically by a less severe anaemia, with fewer irreversibly sickled cells and more hypochromic and target cells in the stained film. These differences were usually enough to make possible a tentative diagnosis.

The sickle-cell thalassaemia patients were themselves of considerable interest. 3 resulted from Afro-Chinese marriages, and in these patients no Hb-A was found, while the stained films showed notable hypochromia and leptocytosis. 4 were of Afro-Caucasian origin, and in these 15–27% of Hb-A was found, while the stained films were much less abnormal. 3 were of African parentage, and though no Hb-A was present there were none of the usual stigmata of thalassaemia [for a fuller report see this *Bulletin*, 1958, v. 55, 1162]. Thus the effect of the thalassaemia gene appeared to depend on the race of the parent who contributed it.

Alan B. Raper

MacIver, J. E. & Went, L. N. **Further Observations on Abnormal Haemoglobins in Jamaica.** *West Indian Med. J.* 1958, June, v. 7, No. 2, 109–22, 3 figs. (2 on 2 pls.)

In 1956 the authors published results of a survey of abnormal haemoglobins in Jamaica. They reported that by electrophoretic and clinical studies they had discovered 39 cases of sickle-cell anaemia. This claim was criticized in this *Bulletin* [1957, v. 54, 869] and it was pointed out that the haemoglobin pattern of sickle-cell homozygotes and of sickle-cell thalassaemia heterozygotes could be identical and that family study was required for establishing the diagnosis of homozygous sickle-cell anaemia. The present paper makes good the defect of the former and 75 further cases of sickle-cell anaemia are presented. In their series, now amounting to 114 cases, they have studied 48 parents and an S gene was found in each of them. [Here the authors do not seem to realize fully that the important evidence is the finding of sickling in *both* parents. Presence of the S gene in one parent only is less valuable support for assuming

homozygosity in the offspring.] However, in 9 married couples of whom 6 had 1 and 3 had 2 children with sickle-cell anaemia, both partners were found to be sicklers. In addition, 17 single parents were also found to be sicklers, and of 5 women with sickle-cell anaemia 3 had 1, one 2 and one 4 children who were investigated and who were all found to be sicklers. There are only few instances in the literature when it has been shown that women with homozygous sickle-cell anaemia can contribute to the maintenance of the abnormal gene. There is reproduced a family tree in which 9 children of 2 sickle-cell-trait carriers were examined: 1 was normal, 5 were sickle-cell-trait carriers, and 3 had sickle-cell anaemia. One of these was the woman whose 4 children were examined and found to be sicklers.

The paper reports also on patients with sickle-cell–haemoglobin-C disease. Of 45 cases 9 were discovered as a result of family studies of index cases, and in 3 instances a parent of a child with sickle-cell–haemoglobin-C disease was found to suffer from the same condition.

The most interesting part of the paper is that concerned with sickle-cell thalassaemia. There appear to be three main types of the condition in the series of 11 cases seen by the authors. In 3 offspring of Chinese-African marriages, where the thalassaemia gene was contributed by or likely to be derived from a Chinese parent, haemoglobin A was completely suppressed in the phenotype, and the electrophoretic haemoglobin pattern was indistinguishable from that of sickle-cell anaemia. In 5 offspring of Caucasian-African ancestry 15–27% of haemoglobin A was found and the level of haemoglobin F was generally lower than in the Chinese-African group. In three purely African subjects, all belonging to one family, haemoglobin A was absent and the level of haemoglobin F was high. Foetal haemoglobin was also high when the thalassaemia or thalassaemia-like gene was present without sickling in other members of that family. This contrasts with the absence or low concentration of haemoglobin F in classical thalassaemia minor. In all three groups the blood film was quite different from that associated with homozygous sickle-cell anaemia. *H. Lehmann*

Charmot, G. & Reynaud, R. Essais de traitement de l'anémie drépanocytaire par l'Acétazolamide. A propos de dix observations. [**Trials of treating Sickle-Cell Anaemia with Diamox; 10 Observations**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 438–43.

This paper from Brazzaville is concerned with 10 children aged 8 months to 7 years who were suffering from sickle-cell anaemia, the diagnosis being confirmed by electrophoresis of the haemoglobin and by family studies. When these children were in sickle-cell crises they were treated with Diamox 5–10 mgm. per kgm. body weight, once daily.

Compared with observations made on 40 children in whom no such

treatment was given the children treated with Diamox had shorter and less painful crises and there seemed to be an attenuation of haemolysis. [See also this *Bulletin*, 1957, v. 54, 1350.] *H. Lehmann*

Albahary, C., Dreyfus, J. C., Labie, D., Schapira, G. & Tram, L., with the technical collaboration of L. Vigoura. Hémoglobines anormales au Sud-Vietnam (Hémoglobinose C homozygote. Trait E. (Hémoglobine nouvelle). [**Abnormal Haemoglobins in South Vietnam. Homozygous Haemoglobin C Disease. Haemoglobin E Trait. A New Háemoglobin**] *Rev. d'Haematologie.* 1958, Apr.–June, v. 13, No. 2, 163–70, 3 figs. [23 refs.]

113 hospital patients were examined for abnormal haemoglobins in Saigon-Cholon. In a 13-year-old Chinese from Yunnan a haemoglobin consisting entirely of one fraction, with the electrophoretic mobility of haemoglobin C, was found associated with a severe haemoglobinopathy. As haemoglobins C and E are not easily distinguished by electrophoresis at alkaline *p*H, and haemoglobin C has so far never been seen in Asia, specially careful comparisons of the patient's pigment with haemoglobin C and E controls were carried out. [In this connexion reference may be made to recent work by Benzer *et al.* (this *Bulletin*, 1959, v. 56, 88). It was there shown that 3 samples of haemoglobin D, all indistinguishable by electrophoresis, were different in their amino-acid sequence. It is likely therefore that the haemoglobin C in the present case—so unexpected in a Chinese and causing a disease so much more severe than the haemoglobin C disease seen in West Africans—was in fact not identical with the haemoglobin C seen in the West African and American Negro.]

In 3 South Vietnamese haemoglobin E trait was found. In 20 of the 113 patients a hitherto unknown component was discovered and named " Sud-Vietnam ". It moved on paper electrophoresis at alkaline *p*H slightly faster than haemoglobin G and slightly behind haemoglobin A. Haemoglobin F is found in this position but the present haemoglobin was not resistant to alkali and was not easily eluted from amberlite. It also differed from haemoglobin F by the absence of isoleucine. [A haemoglobin with the properties of " Sud-Vietnam " has been described in a Chinese family by Vella *et al.*, *ibid.*, 1958, v. 55, 807, and was named haemoglobin Q.] *H. Lehmann*

Brumpt, L., Brumpt, V., Coquelet, M. L. & De Traverse, P. M. La détection de l'hémoglobine E (Étude des populations cambodgiennes). [**The Finding of Haemoglobin E. A Study of Cambodian Populations**] *Rev. d'Hématologie.* 1958, Jan.–Mar., v. 13, No. 1, 21–30, 6 figs.

On examining 700 Cambodians the authors found 35% to possess haemoglobin E either in combination with haemoglobin A or together

with haemoglobin F. No other abnormal haemoglobin was discovered. The proportion of "homozygotes" (*i.e.* of people in whom E was the only adult haemoglobin) to heterozygotes (AE) was 1:5. The authors themselves remark that on occasion the E homozygote had only one parent with haemoglobin E. [The explanation is of course that the AE heterozygote who also carries a thalassaemia gene does as a rule show no haemoglobin A in the phenotype. Hence the very large proportion of E homozygotes is presumably composed of both AE heterozygotes with thalassaemia and true E homozygotes.]

[Although the existence of haemoglobin A_2, a haemoglobin-E-like haemoglobin in its electrophoretic properties, is known to the authors, they do not take fully into account that this component is increased in proportion in thalassaemia, and though normally not noted in routine paper electrophoresis may be visible when the subject is a thalassaemic. Hence the "AE heterozygotes" in this study are composed of A homozygotes with thalassaemia and true AE heterozygotes. It is difficult therefore to accept the high incidence of haemoglobin E reported and, among these, the high proportion of E homozygotes.]

Nevertheless, whether the alleged 43 E homozygotes were in fact all homozygotes or whether they included a proportion of patients with haemoglobin E thalassaemia, it is of interest that they were all fairly well. There was no significant difference between the distribution of the ABO blood groups in 350 subjects without, and 155 with, haemoglobin E.

H. Lehmann

Jim, R. T. S. **Hemoglobin H Disease.** *Arch. Intern. Med.* 1958, Sept., v. 102, No. 3, 400–404, 4 figs. [11 refs.]

This is a detailed description of haemoglobin H disease in a 42-year-old Chinese seen in Hawaii. There was a microcytic hypochromic anaemia associated with a higher than normal serum iron level of 195 μgm.%. One sister seemed to have the thalassaemia trait.

There have now been quite a few descriptions of haemoglobin H disease and its mode of inheritance—the absence of haemoglobin H in parents and offspring but the finding of thalassaemia in some of them. The present paper summarizes the various theories advanced to explain these observations. Unfortunately in the present instance permission to examine the mother (the father had died aged 88) and children of the patient was refused.

H. Lehmann

Gerald, P. S. **The Electrophoretic and Spectroscopic Characterization of Hgb M.** *Blood.* 1958, Oct., v. 13, No. 10, 936–49, 6 figs. [17 refs.]

VENOMS AND ANTIVENENES

Institut Pasteur du Viêt-Nam. Rapport annuel sur le fonctionnement technique, année 1957. 137 pp. Serpents marins venimeux (Hydrophiidae) et leurs venins, [**Poisonous Sea Snakes (Hydrophiidae) and their Venoms**] pp. 30–36, 3 graphs. 1958. [40 V.N. Piastres.]

In an estuary of the coastal waters in the region of Phan-Ri, Viet-Nam, 7 species of poisonous sea snakes have been identified, namely *Lapemis hardwickii*, *Enhydrina schistosa*, *Hydrophis*, *Kolpophis annandalei*, *Thalassophina viperina*, *Aipysurus eydouxii*, *Microcephalophis gracilis*. The snakes are not aggressive. They are commonly caught in fishing nets and are freely handled [by the tail !] by the fishermen who throw them back into the sea. When they are thrown on to the beach they die, being usually unable to escape across the few metres to the sea.

Fishermen are well aware of the effects of snake bite. There is some mortality, but there is also considerable superstitious reticence on the subject.

Sea snakes live well in captivity in sea-water. Individual snakes produce very little venom, but the amount varies and is not always proportional to the size of the snake. The plasma anticoagulant and haemolytic effects of the venoms of *Lapemis*, *Hydrophis*, and *Enhydrina* were found to be much the same as those of the venom of *Naja tripudians*. Full experimental details are given elsewhere [see below].

B. G. Macgraith

Barme, M., with the technical collaboration of Nguyen Xuan Mai. Contribution à l'étude des serpents marins venimeux Hydrophiidae du Viet-Nam. [**Studies of Poisonous Sea Snakes (Hydrophiidae) of Viet-Nam**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 258–65, 3 figs. on 2 pls.

7 genera of Hydrophiidae were identified in the waters of the Viet-Nam coast in 1957. Specimens of three (*Lapemis hardwickii*, *Enhydrina schistosa*, *Hydrophis*) were maintained alive in sea-water and studied.

Venom from all three was lethal to rabbits and mice. The animals died from respiratory paralysis. The venoms showed anticoagulant effects on plasma similar to those of cobra venom (*Naja tripudians*). Haemolytic action on horse corpuscles was also similar to that of cobra venom, but unlike the latter, the sea-snake venoms lysed sheep and bovine corpuscles [this *Bulletin*, 1936, v. 33, 384]. Electrophoresis of the three venoms gave similar patterns, with maximum movement towards the cathode.

The author concludes that sea-snake venom is more active than cobra venom. There is, however, great variation in the amount of venom produced at a given time by individual snakes.

The action of the venom resembles that of cobra venom. Electrophoretic patterns in the three venoms examined were so alike that their antigenic properties might well be very similar. If this is the case, an efficient polyvalent antiserum should be produced. Work is in progress on these points.

[See also Reid, this *Bulletin*, 1957, v. 54, 747, 1352; 1958, v. 55, 314.]

B. G. Maegraith

Yang, Chen-Chung & Takemura, S. **Biochemical Studies on the Formosan Snake Venoms. I. On the Mechanism of the Action of Formosan Cobra Venom on Nucleic Acids.** *J. Formosan Med. Ass.* 1958, June, v. 57, No. 6, 349–56, 2 figs. (1 on pl.) [11 refs.]

Haneveld, G. T.; Hoeke, J. O. O.; Kok, J. **Eye Lesions caused by the Exudate of Tropical Millipedes. I. Report on a Case** [Haneveld]. *Trop. & Geograph. Med.* Amsterdam. 1958, June, v. 10, No. 2, 165–7. **II. Composition of the Exudate** [Hoeke & Kok]. *Ibid.*, 168–70.

i. An account is given of a personal experience when the author was squirted in the eye by a large millipede from New Guinea. The millipede was 15 cm. in length and squirted a jet of fluid at a distance of 25 cm. into the author's right eye. A fierce burning sensation was produced which was unrelieved by washing with boric acid solution. There was a marked conjunctival reaction and a bluish-white discoloration of the bulbar conjunctiva medial to the pupil. The condition persisted for 36 hours but vision and pupillary reactions were unaffected; at the end of this time small follicles appeared on the swollen conjunctiva. The symptoms had almost disappeared after 3 days.

Treatment needs to be immediate and consists of washing the fluid away with warm water, administration of local anaesthetic and a bland eye ointment. Cortisone ointment or eye drops are also recommended. It seems likely that the Papuan belief that an injection in the eye from a millipede may cause blindness is correct.

ii. The second part of the communication deals with the examination of the exudate from the millipede and the authors conclude that it does not contain free or organically bound iodine, cyanide, lower fatty acids, histamine, amino acids or polypeptides, but probably contains a polymer of a quinone or a polyvalent phenol derivative.

[It is unfortunate that no mention is made of the species of millipede responsible in this otherwise extremely interesting communication: there is, however, an implication that it may have been *Iulus spirobolus spinosus*.]

E. R. Nye

TOXOPLASMOSIS

Orio, J., Depoux, R., Heuls, J. & Ceccaldi, J. Contribution à l'étude de la toxoplasmose en Afrique Équatoriale. Enquête sérologique sur la toxoplasmose humaine au Moyen-Congo. [**Toxoplasmosis in Equatorial Africa. Serological Survey on Toxoplasmosis in Man in the Middle Congo**] *Bull. Soc. Path. Exot.* 1958, Jan.–Feb., v. 51, No. 1, 66–75, 1 fig. [23 refs.]

The history of toxoplasmosis in French and Belgian African territories is briefly reviewed, and the authors [including the late Dr. J. Ceccaldi whose premature death is so much regretted] then describe an investigation into the incidence of the infection in Brazzaville as measured by the complement-fixation reaction (Kolmer method) of the serum, with antigen prepared from African strains of the organism. 1,139 sera of the general population showed negative reactions in children up to the age of 5 years, 7% positive in the 5 to 15 year group, 12% positive in the 15 to 30 year group and 9% positive in the older groups. (A reaction was considered positive if present at a dilution of 1 in 8 or greater.) 45 sera of people with mental or ocular (chorio-retinitis) abnormalities gave 5 positives; 50 sera of patients with malaria and 30 with sleeping sickness both yielded a 10% incidence.

It is interesting to note that neither of the latter parasitic infections was responsible for false positives, because the incidence of positives in these groups was approximately the same as that of the general population in Africa or metropolitan France. *P. C. C. Garnham*

Cook, M. Katherine & Jacobs, L. **Cultivation of *Toxoplasma gondii* in Tissue Cultures of Various Derivations.** *J. Parasitology.* 1958, Apr., v. 44, No. 2, 172–82, 1 fig. [35 refs.]

The authors describe experiments whose purpose was to determine the type of host cells supporting the growth of *Toxoplasma* in culture and the factors favouring its cultivation. The account is preceded by a useful table summarizing previous work on cultivation of the parasite. The authors cultivated a great variety of cells and tissues from different birds and mammals (including man) in roller tubes. Most of the host cells inoculated with toxoplasms underwent degeneration after several days, but cultures of human conjunctival epithelium and intestine, particularly the fibroblasts, survived long enough for the parasites to infect mice. It was demonstrated that the time required by the parasites for penetration of the host cells (monkey kidney) varied, probably owing to the presence of non-susceptible cells in the culture. Furthermore, it was shown that the higher the temperature at which the culture was grown, the shorter the time of their survival owing to more rapid proliferation of

the parasites at higher temperatures. Multiplication of *Toxoplasma* in monkey kidney cells was not affected by treating the latter with colchicine, nor was any difference observed in the reaction of host cells in cultures varying in age. In order to determine the effect of prolonged cultivation of *Toxoplasma* upon its virulence, a comparison was made between a strain maintained in 43 passages of monkey kidney cell cultures and 103 mouse passages, and it was found that no significant changes of virulence occurred after cultivation. Finally, experimental tests failed to reveal the presence in *Toxoplasma* tissue cultures of any toxin produced by the parasite. *C. A. Hoare*

Westphal, A. Über die Trennung von Toxoplasmen und Exsudatzellen. [**Separation of Toxoplasms and Exudate Cells**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 217–24, 4 figs.

Körting, H. J. Immunoelektrophoretische Untersuchungen bei der Toxoplasmose. [**Immuno-Electrophoretic Investigations on Toxoplasmosis**] *Zent. f. Bakt.* I. Abt. Orig. 1958, v. 172, Nos. 7/8, 621–9, 3 figs. [40 refs.]

Cooney, Marion K.; Kimball, Anne C.; Bauer, H.; Sheppard, C. G. **Studies on Toxoplasmosis. I. Complement Fixation Tests with Peritoneal Exudate Antigen** [Cooney, Kimball & Bauer]. *J. Immunology.* 1958, Sept., v. 81, No. 3, 177–86, 2 figs. [35 refs.] **II.** *Toxoplasma* **Antibodies in Obstetrical Patients with Extensive Serological Follow-Up** [Kimball, Cooney, Bauer & Sheppard]. *Ibid.*, 187–93.

i. The authors compared antigens made from the chorio-allantoic membrane of the developing chick and from peritoneal exudate from the mouse for the complement-fixation test for toxoplasmosis. They concluded that although the peritoneal exudate antigen is more frequently anticomplementary it has certain clear advantages over the egg antigen, for example, the peritoneal exudate antigen appears to be a slightly more sensitive indicator of a rising antibody titre; normal people are less frequently positive with it and non-specific reactions are less frequent than with the egg antigen.

ii. The dye test for toxoplasmosis was positive in 31·5% of 327 women from an obstetrical practice. During a 5-year follow-up 5% of the patients changed from negative to positive and of 88 patients where the dye test was positive at 1 in 4 or more it became negative in only 1. 3 of these 88 patients underwent a 16-fold rise in titre during the period

of observation and this was ascribed to either the rupture of pseudocysts or further stimulation of antibody formation by re-exposure.

I. A. B. Cathie

Fair, J. R. **Congenital Toxoplasmosis—Diagnostic Importance of Chorioretinitis.** *J. Amer. Med. Ass.* 1958, Sept. 20, v. 168, No. 3, 250–53, 22 figs.

This is a brief but comprehensive account of the ocular findings in cases of toxoplasmosis. There are some helpful retinal photographs in black and white. The author stresses that not even the most experienced ophthalmoscopist can express an opinion without dilating the pupils of the patients. He recommends the use of one or two drops of 10% solution of phenylephrine hydrochloride (Neo-Synephrine). He thinks that if this were done more often in children and young adults many more cases of this disease would be recognized. The differential diagnosis of the fundus lesions is discussed but treatment is not referred to.

D. P. Choyce

De Roever-Bonnet, H. Toxoplasma infecties bij huisdieren en slachtvee. [**Toxoplasma Infection in Domestic and Slaughter Animals**] *Tijdschr. v. Diergeneesk.* 1958, Nov. 1, v. 83, No. 21, 1073–7.

The English summary appended to the paper is as follows:—

"Serological investigation, using the Sabin-Feldman staining technique, revealed that in cats and dogs suspected of Toxoplasma infection the number of positive findings in cats exceeded that in dogs, but that there was no significant difference between the number of positive dogs and cats when both suspect and non-suspect animals were included.

"In slaughter animals (cattle, pigs and sheep) a number of positive reactions was found. It appeared that in spring the number of positive reactions was higher than that found in autumn. Proof of the specificity of the serologic reactions was obtained by culture of the parasite (Toxoplasma) from 4 out of 30 brains of sheep randomly slaughtered at the public slaughter-house."

Lewis, W. P. & Markell, E. K. **Acquisition of Immunity to Toxoplasmosis by the Newborn Rat.** *Exper. Parasit.* New York. 1958. Sept., v. 7, No. 5, 463–7.

DERMATOLOGY AND FUNGUS DISEASES

KIRK, R. & MORGAN, H. V. **The Systemic Mycoses.** *J. Trop. Med. & Hyg.* 1958, Sept., v. 61, No. 9, 215–28, 13 figs. [35 refs.]

These authors, one from Singapore, the other from Khartoum, have in this paper drawn up a timely and much needed classification of the mycoses, together with a short explanatory description.

Clinically the diseases caused by pathogenic fungi fall into two main groups:—

(i) the superficial mycoses, in which the fungal infection is confined to the skin and its appendages, and

(ii) the deep mycoses, which are potentially systemic infections.

The deep mycoses tend to be more limited in geographical distribution. Systemic mycoses should be considered in differential diagnosis of certain clinical pictures, of which 13 are listed.

Mycetoma is divided into the "maduromycotic", in which the grains are composed of large segmented mycelial filaments, and the "actinomycotic", in which the grains are composed of very fine, non-segmented, mycelial filaments, without chlamydospores. Numerous species of fungi are listed as possible causes of mycetoma, but the most covenient classification is based on the colour of the grains, namely (1) black madura, (2) yellow or white madura, and (3) red madura. In the Sudan ABBOTT [this *Bulletin*, 1956, v. 53, 802] found the fungi isolated to be *Madurella mycetomi* from black madura, *Streptomyces somaliensis* from yellow madura and *S. pelletieri* from red madura. The lesions in black mycetoma have a characteristic appearance and tend to be more localized and less invasive than those of other varieties.

Sporotrichosis results from infection, most commonly of the subcutaneous tissues and lymphatic vessels, with the fungi *Sporotrichum schencki* and *S. beurmanni* [now regarded as synonymous]. Fungi of this genus occur naturally as saprophytes on many kinds of vegetation and timber and as "bud rot" in carnations. The initial lesion, or sporotrichotic chancre, develops at the site of inoculation.

Histoplasmosis (*Histoplasma capsulatum*) is widely distributed in America and Africa. In the classical form the disease clinically resembles kala azar. The parasites are found, often in large numbers, in the reticulo-endothelial cells. The lungs are usually involved and sometimes are the only site of the disease. Ulcerative lesions of the skin and mucous membranes of the mouth and nose, resembling those of leishmaniasis, are presumably of a secondary nature.

Other fungus infections briefly discussed are actinomycosis, blastomycosis, cryptococcosis (torulosis), coccidioidomycosis, rhinosporidiosis, and moniliasis.

As regards moniliasis, *Candida albicans* may infect the lungs, producing broncho-pulmonary moniliasis with persistent cough. Severe infections

may resemble pulmonary tuberculosis. Fatal systemic infections have been reported since the introduction of broad-spectrum antibiotics. Until recently there was no satisfactory treatment for systemic moniliasis, but the anti-fungal agent nystatin, isolated from *Streptomyces nouresi*, appears to be effective in all forms of moniliasis. *Philip Manson-Bahr*

Blake, W. P., Hubbard, J. W. & Micuda, J. **Coccidioidomycosis—Report of a Disseminated Case in a Dog.** *J. Amer. Vet. Med. Ass.* 1958, Oct. 15, v. 133, No. 8, 437–8, 2 figs.

Lacaz, C. da S. & Sampaio, S. A. P. Tratamento da blastomicose Sul-Americana com anfotericina B. Resultados preliminares. [**Treatment of South American Blastomycosis with Amphotericin B. Preliminary Results**] Reprinted from *Rev. Paulista Med.* 1958, June, v. 52, No. 6, 443–50, 2 figs. [18 refs.] English summary.

The authors, from São Paulo, Brazil, review some of the results obtained by others with the use of Amphotericin B, in the treatment of various mycotic infections, and then give detailed accounts of 4 patients with South American blastomycosis treated by them. The patients were aged 52, 28, 26 and 32 years and had suffered from the disease for 19, 10, 2 and 10 years, respectively. The infections had resisted treatment with sulphonamides and had become progressively more severe.

Amphotericin B in 5% dextrose was given by intravenous infusion over 12 to 18 hours. It was given on alternate days, with an initial dose of 0·25 mgm./kgm., followed by 0·5 mgm./kgm., 10 mgm./kgm. and 1·5 mgm./kgm. Total doses amounted to between 0·49 and 1 gm. Rapid improvement of the disease resulted, with clinical cure after 4 to 6 weeks of treatment. Side-effects, which mainly took the form of chills and fever were sometimes severe and in one case necessitated suspension of treatment; antipyretics and antihistaminics were of little value in controlling these reactions, but 15 mgm. of prednisone given before the intravenous infusion and repeated after 6 hours was effective in controlling the fever. Local inflammatory reactions or thrombophlebitis also occurred.

While the authors conclude that the effect of Amphotericin B was dramatic in these cases, they wisely point out that final evaluation must await follow-up, especially in regard to any possible relapses or resistance.

H. J. O'D. Burke-Gaffney

Da Rocha Passos, M. C., Jr. Caso de blastomicose sul-americana, de localização pulmonar tratado pela 6-sulfanilamida-2,4-dimetil-pirimidina. [**A Case of South American Blastomycosis with Pulmonary**

Localization treated with 6-Sulphanilamido-2,4-dimethyl-pyrimidine (Elkosin)] Reprinted from *Hospital.* Rio de Janeiro. 1958, May, v. 53, No. 5, 651–72, 17 figs.

The author, from São Paulo, Brazil, records in very great detail the treatment with Elkosin (6-sulphanilamido-2,4-dimethyl-pyrimidine) of a man of 43 suffering from South American blastomycosis with extensive lesions in both lungs. Full studies of the lungs, blood, urine and sputum were made and these are recorded, together with several radiographic pictures. The maintenance dose was 8 tablets daily and treatment was continued for 13 months, by which time the patient had received 3,120 tablets (1,560 gm.) of the drug. There was marked clinical and radiological improvement and *Paracoccidioides brasiliensis* eventually disappeared from the sputum. *In vitro* tests, which are described, did not correspond with the *in vivo* findings, since little or no fungistatic action was found at the usual therapeutic levels. No intolerance to the drug was noted. It is clear that more numerous observations require to be made in regard to the action of this drug in South American blastomycosis. *H. J. O'D. Burke-Gaffney*

TROPICAL OPHTHALMOLOGY

Bietti, G. B. **Problems of Trachoma in Japan.** *Rev. Internat. du Trachome.* 1958, v. 35, No. 3, 275–94.

See also p. 221, Fair, **Congenital Toxoplasmosis—Diagnostic Importance of Chorioretinitis.**

Pampiglione, S. Indagine epidemiologica sulla miasi congiuntivale umana da *Oestrus ovis* in Italia. Nota I: Inchiesta tra i medici italiani. [**Epidemiological Enquiry on Conjunctival Myiasis due to** *Oestrus ovis* **in Italy. I. Enquiry from Italian Doctors**] *Nuovi Ann. d'Igiene e Microbiol.* 1958, May–June, v. 9, No. 3, 242–63, 2 figs. [33 refs.]

A survey of the problem of conjunctival myiasis in Italy was carried out by circularizing 5,000 country practitioners. 414 cases were reported, of which more than half came from Sardinia. Two tables in the beginning of the paper give information relating to previously reported cases. The case data of the 414 cases collected by the author are similarly set out and give the locality, source of information and occupation.

where known, of the patients. Sections on diagnosis, differential diagnosis, prognosis and therapy are given. In the section on therapy there is a brief review of the various methods employed by the doctors and clinics whose cases are reviewed. These consist mainly of removal of the larvae and local antiseptic measures, ranging from penicillin eye ointment to yellow oxide of mercury ointment. In a case of a baby general anaesthesia was necessary to remove the larvae.

Of the cases noted 77% occurred in shepherds, and note is also made of the occurrence of oral, nasal, tonsillar, pharyngeal, laryngeal and aural myiasis due to *Oestrus ovis*. *E. R. Nye*

TROPICAL ULCER

Blaine, G. **Tropical Phagaedenic Ulcer in Jamaica. Evaluation of New Ambulatory Methods of Treatment.** *West Indian Med. J.* 1957, Dec., v. 6, No. 4, 285–97, 11 figs. on 3 pls. [30 refs.]

The author reviews the literature of tropical phagaedenic ulcer and discusses various methods of treatment. In order to tackle the varied bacterial flora and the difficulty sometimes experienced in removal of the pseudomembrane, he compounded a free-flowing powder mixture of bacitracin, polymyxin B, neomycin and hyaluronidase (Wyeth powder). This was tried in 200 patients in two clinics 25 miles apart. Cases were classified as acute (up to one month's history), chronic (up to 6 months) and chronic indolent (6 months to 10 years and more). Of these, 165 were treated once weekly, the remainder twice weekly, for up to a year.

Controls were given other treatments including streptokinase-dornase (10), Sanguinin (12), penicillin, systemic and local (15), other antibiotics or chemotherapy (12) and vitamin B and dietary adjustment (20).

With the Wyeth powder all the acute ulcers healed within 6 months: 56 of 64 chronic ulcers healed in a year. Of the chronic indolent ulcers with a history of not more than a year, 12 out of 15 healed in 12 months. Of the remainder, 6 out of 20 healed in the same time. There were no toxic or allergic reactions. The putrid odour disappeared in a few weeks. Mixture of the powder with 2% Novotax was useful for achieving local anaesthesia for biopsy. In the more indolent cases the treatment with powder was largely successful as a method of preparing the area for skin grafting.

None of the controls healed as rapidly or successfully. Sanguinin increased local pain and smell. Penicillin gave indifferent results and in some cases led to allergic effects. Vitamin B and dietary supplements did not affect the response to any of the treatments.

The author believes that general hygiene education and organized treatment are needed to lower and control the incidence of tropical ulcer. Teams of medical and ancillary personnel should demonstrate the principles in rural health centres. Macroscopic and microscopic appearances are well illustrated in 11 figures. *B. G. Maegraith*

MISCELLANEOUS DISEASES

Davey, T. H. **Domestic Animals and Human Disease.** *J. Roy. Inst. Pub. Health & Hyg.* 1958, Jan., v. 21, No. 1, 15–24.

In introducing the subject of this lecture the speaker said " The number of human infections recognized as being derived from animals is increasing and more than 80 of these shared infections have already been identified, of which only a small proportion are important and prevalent diseases of man ". He gave a general, balanced survey of the " infections of man, normally inhabiting animals which are in sustained close contact with man " and hence deliberately omitted most of the " dramatic, epidemic diseases which man contracts from wild animal hosts ". In the lecture the diseases which were specially considered were tapeworm infections, trichinellosis, bovine tuberculosis, salmonella infections, brucellosis, Q fever, rabies, hydatid disease, anthrax and leptospirosis. Some other diseases included in the survey were louping ill in England and Scotland, viral encephalitis and schistosomiasis. All these diseases were described from the point of view of their different methods of spread and other epidemiological facts, the extent to which they affect man and the economic loss they caused by mortality of farm animals. Prevention of these diseases is still in general a problem which must be tackled by the organization of the human and veterinary protective services and by much further research. *M. E. Delafield*

Andrews, J. M. **Tropical Allergens and Allergic Diseases. Presidential Address before the 1957 Annual Meeting of the American Society of Tropical Medicine and Hygiene.** *Amer. J. Trop. Med. & Hyg.* 1958, Mar., v. 7, No. 2, 141–9. [Numerous refs.]

This interesting address amounts to a plea for more careful consideration of the medical and serological significance of tropical allergies and allergens. There is a real need for evaluating the role of allergy in tropical disease. Allergic phenomena in parasitic and infectious processes in the tropics are well defined and are receiving considerable attention. The same is true of allergic reactions to certain chemotherapeutic agents

such as quinine and mepacrine. Hay fever and asthma from pollens or fungus spores are not rare in the tropics. On the whole, however, despite the lush vegetation, allergic disturbances are probably less prominent in the tropics than in temperate climates, possibly because of the restricted temperate distribution of the highly antigenic ragweeds and other agents, and also because of some racial factor. Allergic effects, such as those arising from "house dust", must nevertheless constitute a problem of considerable size and importance in the enormous populations of the tropics. The study of these phenomena, for example food sensitivities, is clearly important and largely overlooked.

In this connexion the author aptly quotes the famous remark of Lucretius: "One man's meat is another man's poison".

B. G. Maegraith

Yuan, Hsiung-Hsiang. **A Case of Rhinoscleroma involving Ethmoid Cells, Maxillary Sinus and Orbit.** *Chinese Med. J.* Peking. 1958, Sept., v. 77, No. 3, 262–3.

Colling, Margaret; Nigg, Clara; Heckly, R. J. **Toxins of** *Pseudomonas pseudomallei*. **I. Production** *in vitro* [Colling, Nigg & Heckly]. *J. Bacteriology.* 1958, Oct., v. 76, No. 4, 422–6. [10 refs.] **II. Characterization** [Heckly & Nigg]. *Ibid.*, 427–36, 5 figs.

I. "Selected strains of *Pseudomonas pseudomallei* produced a thermolabile lethal toxin *in vitro*. Maximal yields were obtained by incorporating glycerin, heart infusion broth (Difco) and hog gastric mucin into a broth medium and by incubating the cultures statically at 32°C for 7 to 10 days. The active factor in mucin was nondialyzable and precipitable by ethanol.

"The conditions which apparently limit continued toxin production in older cultures are discussed.

"Toxigenicity was apparently not correlated with virulence or colonial morphology."

II. "Two thermolabile exotoxins were demonstrated in crude filtrates of *Pseudomonas pseudomallei* by selective adsorption and elution from Duolite S-30 resin. One toxin was lethal and necrotizing, whereas the other toxin was lethal but nonnecrotizing. The lethal toxin was immunogenic. Neither toxin was inactivated by acetone or alcohol, but both were detoxified by phenol or formaldehyde. Both toxins were precipitated by ammonium sulfate at a final concentration of 35 per cent. The lethal toxin was most stable between pH 6 and 9. Both exotoxins are probably low molecular weight proteins with few ionizable radicals."

[See this *Bulletin*, 1956, v. 53, 371.]

Lusby, Monica & Levine, H. B. **An Intracellular Mortality-Enhancing Material from** *Malleomyces pseudomallei*. *J. Immunology*. 1958, June, v. 80, No. 6, 446–53, 2 figs. [20 refs.]

Non-toxic cellular material from either a virulent or an avirulent strain of *Malleomyces pseudomallei* (= *Pfeifferella whitmori*) given at the same time as an injection of *M. pseudomallei* of intermediate virulence increased the mortality rate in mice. If this material was given several days before the dose of organisms the mice were more resistant to infection. Cellular material from *M. pseudomallei* also increased the mortality rate in mice infected with *Pasteurella pestis* but cellular material from this organism did not alter the course of melioidosis or plague. Certain physical and chemical properties of the active component are described but its exact chemical composition is not yet known.

The authors believe that it acts by suppressing host resistance to growth, thus resembling the aggressin isolated from virulent and avirulent strains of *Bacillus anthracis* [Zwartouw and Smith, *Bull. Hyg.*, 1956, v. 31, 1043]. *Sheila McDonald*

Stolze, E. **Histological Report on 152 Post-Mortem Liver Punctures in Surinam.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 272–6, 1 diagram. [10 refs.]

Wang, Yu-Ling & Chen, Wei-Tung. [**Eighty Cases of Liver Abscess**] *J. Formosan Med. Ass.* 1958, June, v. 57, No. 6, 358–69, 2 charts. [In Chinese.] English summary.

Payet, M., Pène, P., Camain, R. & Armengaud, M. Les cirrhoses en Afrique Occidentale Française. [**Cirrhosis in French West Africa**] *Bull. et Mém. Ecole Nat. Méd. Pharm. de Dakar*. 1957, v. 5, 16–40, 13 text figs. & 4 coloured figs. on pl.

The authors have made a very full study of 214 cases of liver cirrhosis admitted to hospital in Dakar between 1952 and 1957 (total admissions: 10,133). Each case was analysed in the same manner according to civil state, ecology, family and clinical history and background, clinical signs, pathology, etc. Details of the technique of the investigation, including coding of information, etc., are given in full.

Cirrhosis occurred in 143 men and 71 women among 200 Africans and 14 persons of mixed African European descent: in 140 patients the disease developed between 20 and 39 years of age: 176 were Moslems, of which only one drank alcohol (as compared with 14 out of 38 Christians).

Antecedent medical history included alcohol (13), malaria (very

frequent) and jaundice: 35 patients had jaundice on admission, 25 had had it within 6 months of admission, 22 within 5 years and 5 more than 5 years before admission: 18 had had haematuria. Pregnancy did not seem to be a significant factor.

An analysis is made of clinical signs. Ascites was present in 118 patients, the spleen was enlarged in 99, there was an enlarged heart in 16. Only 4 showed overt signs of portal hypertension. Miliary tuberculosis involving the liver and spleen was present in 3. *Plasmodium falciparum* were found in 56. *Schistosoma haematobium* eggs were found in the urine in 26 and twice that number had cystoscopic evidence of schistosomiasis. One patient had secondary carcinomatous deposits in the liver and another an amoebic abscess.

Details are given of plasma protein electrophoretic patterns, liver function tests and blood examinations. The histopathology of specimens of liver taken at autopsy (59) and biopsy (203) is described and analysed. Histological information is given for the spleen, kidneys and pancreas.

The authors conclude that cirrhosis, as seen in their hospital, is a disease of young African adults, commoner in men than in women. Malnutrition does not appear to be a major factor in its aetiology. In 20% of cases the aetiological factor could be defined, including infective hepatitis, schistosomiasis and malaria (14 cases were attributed to *P. falciparum*). In the rest, there was no clue to the cause, except that the histological picture suggested a slowly evolving inflammatory fibrosis, which may or may not have been viral. The possibility exists that the patient concerned may have provided a suitable biological terrain for the development of cirrhosis.

They suggest that for the time being some general term, such as " common form of cirrhosis of Africans " might be used to describe those changes occurring without any clear aetiological background.

[The text should be read carefully for details.] *B. G. Maegraith*

Payet, M., Armengaud, M., Camain, R., Baylet, R., Pène, P. & Linhart, J. Les hépatosplénomégalies de l'adulte. [**Hepatosplenomegaly of the Adult**] *Bull. et Mém. Ecole Nat. Méd. Pharm. de Dakar.* 1957, v. 5, 41–54, 4 coloured figs. on pl.

Hepatosplenomegaly is not a good term. It would be better to use the phrase " hepatosplenopathy ", since hepatomegaly is inconstant even though the liver is anatomically damaged. In 242 autopsies at Dakar, the spleen weighed more than 200 gm. in 165 cases, 100–200 gm. in 63 and only 14 weighed 100 gm. or less.

During 2 years the authors made a carefully planned social and medical survey of 100 hospital patients with enlarged spleens: 10 died (reticulosarcoma, lymphoid leukaemia, Hodgkin's disease, severe anaemia, overwhelming haematemesis, typhoid, tuberculosis involving the spleen,

trypanosomiasis). Splenectomy was performed in 17 patients (tuberculosis, haematemesis, lymphosarcoma, schistosomiasis (1 case), lymphoid leukaemia).

The cause of the splenic enlargement was detected in 24 patients only (tuberculosis, 5; typhoid, 2; prolonged infective hepatitis, 1; trypanosomiasis, 2; various haemopathies, 14 including leukaemia, lymphosarcoma, Hodgkin's disease, 1 case of sickle-cell anaemia). Schistosomiasis was found in the spleen of 1 patient, ankylostomiasis in another, malaria in others, but the authors point out that " such diseases are frequently observed in subjects without evidence of splenomegaly " [abstracter's translation]. For instance, the incidence of schistosomiasis in the group of patients under examination was identical with that in the Africans in the district as a whole.

The combination of large spleen and liver in the African thus occurs as secondary phenomenon to well-known causes, such as malaria and schistosomiasis. In many cases no obvious aetiological factors can be found. The authors suggest that some of these cases may represent a clinical entity which they call " hepato-splenic reticulo-endotheliopathy ".

B. G. Maegraith

Basu, A. K. **Chronic Splenomegaly and its relation to Hepatic Pathology.** *Brit. Med. J.* 1958, Oct. 18, 947–50. [34 refs.]

Chronic splenomegaly and related hepatic conditions have been studied by the author in Calcutta on the following schedule: (1) haematological, including bone-marrow study, (2) biochemical, (3) radiological, by oesophagogram and splenoportal venogram.

72 cases of this kind have been investigated of which 39 were studied in great detail from the viewpoint of liver pathology. These were then divided into four categories:

(1) chronic splenomegaly without evidence of liver cirrhosis or portal hypertension (1 case);
(2) chronic splenomegaly associated with cirrhosis of liver and portal hypertension (22 cases);
(3) chronic splenomegaly associated with extrahepatic obstruction (12 cases);
(4) chronic splenomegaly due to specific diseases (kala azar, 2; haemolytic anaemia, 2).

Extrahepatic obstruction included tumours of the pancreas, pancreatic fibrosis, portal venous thrombosis and congenital cavernomatous transformation of the portal vein. Cases associated with kala azar and haemolytic anaemia showed reticulo-endothelial cell hyperplasia.

Whenever the histology of the spleen showed evidence of congestive changes—dilatation of sinusoids, periarterial haemorrhages and erythrophagocytosis, the liver also revealed greater or lesser degrees of fibrosis.

Splenectomy has been performed on a large number of cases of fibro-congestive splenomegaly, and spleno-renal shunt operations with splenectomy on a small number. These have been followed up carefully with periodic haematological, liver-function and liver biopsy studies. The results of operations excluding 9 deaths before, during and after operation, and 9 patients not traced, are given as follows:

Overall follow-up for periods varying from 6 months to 6 years	54
Patients doing well	46
Patients with recurrence of haemorrhage	5
Patients developing ascites	3
Patients improved haematologically as compared with pre-operative status	36
Patients improved on basis of liver function tests	26
Patients improved on basis of liver biopsy	16

All these, taken together, point to the fact that the large hypertrophied spleen does adversely affect hepatic function and structure in the already damaged liver. How this is brought about is still problematical.

Philip Manson-Bahr

PARASITOLOGY: GENERAL

Otto, G. F. **Some Reflections on the Ecology of Parasitism.** *J. Parasitology.* 1958, Feb., v. 44, No. 1, 1–27, 1 fig. [Numerous refs.]

In this address to the American Society of Parasitologists the retiring President reviews the present state of our knowledge of the ecology and host-parasite relations in a number of selected diseases especially amoebiasis, and also *Leucocytozoon* infection, filariasis, hookworm disease echinococcosis and trichinosis. He discusses various ecological problems connected with the epidemiology, clinical and laboratory aspects of these infections, draws attention to gaps in our knowledge, and suggests lines of investigation of questions in need of further elucidation. This paper does not lend itself to an abstract, but readers interested in the ecological aspects of the infections dealt with by the author will find much to stimulate thought in the original. *C. A. Hoare*

Rifaat, M. A. & Nagaty, H. F. **The Incidence of Intestinal Parasitic Infections among the Inhabitants of Cairo.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 3/4, 164–73.

This is a study of cases chosen among patients attending the skin out-patient department at Ein-Shams University Hospital, Cairo. 1,018 patients were seen, 948 dwelling in Cairo and 70 from the country, including patients from different age-groups and sexes. The majority were working people and tradesmen but many belonged to the professional

classes. The faeces were examined by the saline flotation method for helminthic infections and by eosin smear for protozoa. If vegetative or cystic forms of protozoa were observed an iodine smear was prepared for further identification of the parasite. Only one examination was made in each case.

Of the 948 Cairo patients 50·4% had intestinal parasites, 35·0% protozoal infections and 26·7% helminths. Combined helminths and protozoa were observed in 10·6%. The general incidence of parasitic infections was nearly the same in all age-groups but, excluding *Hymenolepis nana* (6·5%), helminthic infections were less common below 5 years. The figure for *Enterobius* (5·2%) does not represent the real incidence as perianal swabs were not examined. Again in the case of *Schistosoma mansoni* [figure not given] rectal swabs were not taken and the figure may be lower than the actual incidence. Among the protozoa *Entamoeba histolytica* cysts (11·6%) were found to be more common among those above 10 years of age.

The incidence of infection in country patients was much higher than in those from the town, being 75·7% positive. *Ascaris* infections were more than double, while the incidence of *Trichostrongylus* was twice and *Ancylostoma* nearly 5 times as high. There was not much difference in the incidence of protozoal infections.

Among the Cairo patients were 49 food handlers. Of these, 67·3% were positive for intestinal parasitic infections *P. A. Clearkin*

Kuntz, R. E. & Lawless, D. K. **Acquisition of Intestinal Protozoa and Helminths by Young Children in a Typical Village of Lower Egypt.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 353–7.

The authors, who were members of a U.S. Naval Medical Research Unit, carried out during a 4-month period a study of the acquisition of intestinal fauna by young children living in the village of Sindbis, which lies in an agricultural area of the Nile Delta 16 miles north-west of Cairo. Weekly stool specimens were obtained from each child of three different age-groups: Group I—infants of 1 to 6 months, Group II—13 to 24 months and Group III—26 to 47 months. At the end of the observation period the groups contained 23, 30 and 28 children respectively.

Each specimen on collection was fixed in a solution of merthiolate-iodine-formalin (MIF) and was macerated in a small glass vial. A measure of concentration of helminthic ova and amoebae was obtained by examining a few drops taken from the upper layer of sediment.

The results obtained are effectively tabulated. It is shown that the period of 15–20 months is the one in which most of the fauna establish themselves in the majority of children. It is surprising to learn that, up to the age of 6 months, 62% of the infants have escaped all helminthic and protozoal infections, *Giardia intestinalis* (30%) and *Trichomonas hominis* (9%) alone gaining entry.

During the second year, however, numerous protozoa establish themselves, for *E. histolytica* appeared in 21% (of which 10% represented infection by the small race only), *E. coli* in 10%, *Endolimax nana* in 13%, *Iodamoeba bütschlii* in 10%, *Chilomastix mesnili* in 10% and *Entermonas hominis* in 7%, while the incidence of infection with *Giardia intestinalis* rose to 70% and of *Trichomonas hominis* to 30%. Nematodes also began to appear in this age-group, *Ascaris lumbricoides* and *Enterobius vermicularis* being each found in 10% of the children.

Infection with *E. histolytica* became widespread during the third and fourth years, attaining an incidence of 75% of which one-third were identified as belonging to the small race only. This parasite even exceeded *E. coli* (71%) in frequency, and was only surpassed by *Giardia intestinalis* (82%) in incidence. Helminthic infections also became more frequent and diverse, being represented by *Hymenolepis nana* (46%), *Ascaris lumbricoides* (39%), *Trichostrongylus* species (18%), *Enterobius vermicularis* (18%), while *Ancylostoma* species now appeared in low incidence (4%).

Though the authors discovered no *Schistosoma* ova in any specimen, they quote a previous survey by Weir and his associates made in 1952 in the same village (*J. Egyptian Pub. Health Ass.*, 1952, v. 27, 56) which showed that 6% of children between the age of 1 and 4 years passed ova of *S. mansoni* while in 28% ova of *S. haematobium* were found in the urine.

The authors were surprised to find so low an incidence of infection in the first year of life, since infants crawl actively over ground which is often contaminated with faeces, are usually covered with flies and are fed by hands which are habitually dirty. They suggest that the apparent immunity of young children to protozoal and helminthic infection is attributable to an intestinal environment which is inimical to the development of these parasites, but which becomes more favourable during the second year of life.

[This is a fascinating and praiseworthy study. It emphasizes the need for further research on host-parasite relationships in the elucidation of the many problems of parasitization which remain paradoxical.]

[See also this *Bulletin*, 1956, v. 53, 1181; 1957, v. 54, 624.]

J. H. Walters

Wykoff, D. E., Frick, L. P. & Ritchie, L. S. **Statistical Evaluation of the Formalin-Ether (406th MGL) Fecal Sedimentation Concentration Procedure.** *Amer. J. Trop. Med. & Hyg.* 1958, Mar., v. 7, No. 2, 150–57, 1 fig. [13 refs.]

In 1952 an investigation was carried out on a thousand people living in villages in Honshu, Japan, to determine the value of the formalin-ether

sedimentation procedure for the detection of intestinal helminths and protozoa. 5 faecal specimens on alternate days from each person were examined under semi-field conditions, by highly skilled workers who managed to deal with 40–50 specimens each a day. The results were analysed by the formulae (for "maximum likelihood") of Sawitz and Karpinos (*Amer. J. Hyg.*, 1942, v. 35, 15) and are expressed as efficiency values. Many variables were encountered, including "false negatives" and these made it difficult to draw precise conclusions. Nevertheless useful indications were obtained which showed in general that the concentration method was about as good as the zinc sulphate flotation technique. In detail, the efficiency values were as follows:— *Entamoeba histolytica* (cysts only) 60%, *E. coli* 75%, *Giardia intestinalis* 44%, *Ascaris* and *Trichuris* 92%, hookworm 79% and *Schistosoma japonicum* 48%. It is suggested that the examination of 5 specimens of faeces on alternate days will reveal 97% of cases of amoebiasis in a population.

P. C. C. Garnham

See also p. 248, Jeska & Gentzkow, **Staining Fecal Protozoa after Fixation in Formalin.**

Ricci, M. & Corbo, S. Parassitismo intestinale e posizione auxologica del bambino. (Nota I.) [**Intestinal Parasites and their Relation to the Growth of Children**] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 187–208, 22 figs. English summary.

The authors go into this in very great detail. They examined, for intestinal helminths and protozoa, 796 children from 2 elementary schools in a rural area where hygiene conditions were not good, in Latina province (near Rome). They also recorded the height and weight. 29 children (8 without, and 21 with parasites) were excluded because they differed so markedly physically from the rest (they included 4 dwarfs). Of the remaining 767, 707 had parasites and 60 had none.

From the point of view of general body formation, 51% of the children with parasites were typosomes.

Enterobius and *Trichuris* were the most frequent helminths found, but *Hymenolepis* was evidently quite common [for some reason the figures for this are not given separately]. *Giardia* was the most frequently found protozoon. *Ascaris* was not common.

The results showed that there was a difference in the growth and build of children without, and those with parasites, in favour of the former, and a marked difference in weight, again in favour of those without parasites. The differences were considered statistically significant.

[It might be thought that 0·5% of dwarfs was rather high, and it does not appear that the total population was compared with a standard.]

W. K. Dunscombe

Mastràndreà, G. & De Dominicis, A. Del reperto di parassiti intestinali nell'appendice. (Osservazioni su 1000 casi.) [**Intestinal Parasites in the Appendix**] *Giorn. di Malattie Infettive e Parassit.* 1958, Sept., v. 10, No. 9, 809–11.

This is a report of the examination of 1,000 appendices removed for either acute or chronic appendicitis. Each one was divided into 4 pieces, 3 of which were split open, washed with saline and the washings centrifuged and examined for parasites. The fourth piece was fixed and sectioned.

It was found that 275 contained some sort of parasite. *Enterobius* was the most common (15%). *Ascaris* was found in 4·7%. Among the protozoa, *Chilomastix* was the commonest, and *Giardia* was found in only 3 cases. *E. histolytica* was not found, although 2 patients with chronic amoebiasis were operated on who had chronic appendicitis. No schistosomes were found.

A paper on the question of pathogenesis by the same authors is being published shortly.

W. K. Dunscombe

Pepler, W. J. **Pneumocystis Pneumonia.** *South African Med. J.* 1958, Oct. 11, v. 32, No. 41, 1003–4, 3 figs. [19 refs.]

"The first South African case of *Pneumocystis carinii* pneumonia is described.

"The salient clinical and pathological features are briefly reviewed."

Malossi, M. Profilassi e terapia della polmonite interstiziale da *Pneumocystis carinii* mediante somministrazione di preparati di antimonio per via aerosolica. [**Prophylaxis and Treatment of Interstitial Pneumonia due to** *Pneumocystis carinii*] *Giorn. di Malattie Infettive e Parassit.* 1958, Sept., v. 10, No. 9, 765–9, 4 figs. [19 refs.]

The author gives the result of his experiences at the Provincial Children's Institute at Bologna where between 1954 and 1955 plasma-celled interstitial pneumonia was endemic.

He considers without doubt that the aetiological agent was *Pneumocystis carinii* which he calls a protozoon, and in view of the sensitivity of protozoa to antimony preparations and because the organism affects the lungs only, a rational treatment appeared to be by aerosol of Sb

(Neostibosan). This was tried both in prophylaxis and treatment. For prophylaxis, all the nurses at the Institute were treated twice a year, and all the immature and premature babies were given 5 mgm. Neostibosan aerosol daily for 20 applications. In 2½ years 72 children were treated, and among them were 17 who towards the second month showed X-ray evidence of interstitial pneumonia. Only 1 died. For treatment the drug was given in the same manner but with higher doses, and after repeated X-ray examination and, in doubtful cases, tomogram evidence of the condition, 5 mgm. twice daily were given for 20–40 days until the lung fields became clear and the clinical signs and symptoms improved. 17 babies were treated and only 1 died. Supportive treatment by oxygen and cardiac tonics, etc., was also required. The treatment required on an average about 20 days before the patient's condition obviously improved, and the X-ray appearances a further 2–3 months before they returned to normal.

[If the organism is not a protozoon but a yeast, as many think [this *Bulletin*, 1955, v. 52, 578; 1958, v. 55, 222] the rationale of the treatment disappears, even though it still may work.] *W. K. Dunscombe*

Rice Inst. Pamphlet. Houston. 1958, Apr., v. 45, No. 1, 1–208, illustrated. [Numerous refs.] **Symposium on Resistance and Immunity in Parasitic Infections.**

The Rice Institute, Houston, Texas, has completed half a century of work devoted to the advancement of letters, science and art, and on the occasion of the opening of the M. D. Anderson Biological Laboratories, held a symposium on the subjects of resistance and immunity in parasitic infections. W. V. Houston (pp. 1–3) opened the meeting by describing shortly the Rice Institute which he stated was not an institute of technology but in the nature of a small university concentrating largely on post-graduate studies. A. C. Chandler (pp. 4–8) followed with an oration which proved to be not only his swan-song on retirement from the Institute but from life itself, for he died 6 months later on his way to the Lisbon Congresses of Tropical Medicine and Malaria. He traced the development of the Biology Department from its inception in 1913 under Julian Huxley until today, when with new quarters and a young and vigorous staff, a massive programme on the physiological sciences, genetics, microbiology and parasitology is being planned. Dr. Chandler then traced very briefly the work of himself and his collaborators during the last 20 years on immunity with special reference to *Nippostrongylus* and *Hymenolepis* and various protozoa.

The paper by P. F. Russell (*Man Against Malaria—Progress and Problems*, pp. 9–22) is *hors de ligne*; it is the only one not concerned with the subject of immunity. It is an interesting and up to date summary of cosmopolitan malaria which in 1957 caused 200 million cases

of which 1% were fatal. The infection has virtually been extinguished in the United States, where only 20 years ago there were 4 million cases of malaria annually. Russell gives interesting literary records of malaria in American life during the last century. The situation is then reviewed in Europe and Asia and some examples are given of the progress of eradication. Three problems concerning the latter exist today: resistance to insecticides, resistance to antimalarials and the intractability of *Anopheles gambiae* in tropical Africa.

The subject of immunity was discussed in papers of three categories, general, protozoological and helminthological and these are briefly reviewed in this order below.

C. P. Read (*Status of Behavioral and Physiological "Resistance"*, pp. 36–54). The mechanisms of acquired immunity have been much studied during this century, but the subject of natural incompatibility between host and parasite has received little attention. It is discussed first under "Internal Factors Influencing Parasitisms" where the influence of various metabolites is demonstrated in plants and animals by the inhibition of growth of an organism, by rendering the environment unsuitable, by promoting excystment, etc. Next, external factors are considered with particular reference to deficiencies in diet, to the role of carbohydrates in the biology of cestodes, and to behavioural aspects of susceptibility. Lastly the subject of stress is discussed, leading *via* the stimulation of the anterior pituitary gland to the production of cortisone and to the diminution of inflammatory responses, and to far flung speculations on parasitism in general.

W. H. Taliaferro (*The Synthesis and Activities of Antibodies*, pp. 114–140). Antibodies have widely different physico-chemical properties which can be linked with their biological actions. Four aspects of the latter are discussed: precipitation, skin sensitization, lysis and ablastic actions. Unfortunately, there are no absolute methods either for estimating the relevant antibodies or even for knowing whether the antibody is normal globulin, slightly modified globulin or entirely new globulin. Good relative methods exist, however, for quantitative studies of total antibodies and recently progress has been made on their synthesis. Taliaferro and his colleagues have demonstrated the essentially dynamic nature of this process, beginning in acute infection with a possible reaction between antigen and nucleotides, then the main development of a system which, once operative, dispenses with the special antigen and utilizes the amino acids of the pool; the time of synthesis can be as short as 40 minutes or less. This research is largely based on the use of amino acids labelled with ^{35}S and haemoglobin labelled with ^{51}Cr.

C. A. Hoare (*The Enigma of Host-Parasite Relations in Amebiasis*, pp. 23–35). Views on the nature of the organism known generally as *Entamoeba histolytica* are summarized and are shown in the following table.

Aetiology of Amoebiasis

Hypotheses	Unicistic 1913–	Dualistic 1925–	Neo-Dualistic 1957
Non-pathogenic Amoebiasis	*E. histolytica* Small Race	*E. hartmanni*	*E. hartmanni*
	Large Race: Commensal phase (" minuta " form)	*E. dispar*	*E. histolytica* Avirulent large race
Pathogenic Amoebiasis	↕	*E. dysenteriae*	*E. histolytica* Virulent large race:
Subclinical			Dormant in lumen of gut ↕
Clinical	Virulent (tissue) phase (" magna " form)		Invading gut wall

Brumpt's ideas on the different strains are now largely vindicated and differ little from the " neo-dualistic " hypothesis of this paper, which dispenses, however, with new specific names. The author then discusses the factors responsible for the activation of the " invasive race " of *E. histolytica* and regards the action of special intestinal flora as one of the most important, helped probably by proteolytic enzymes of the amoeba itself. Lastly, immunity in amoebiasis is shown either to be non-existent (as evidenced by the ease of reinfection) or only partial and affecting certain aspects of the complex (as shown by complement-fixation tests—strong only in systemic infections—intradermal tests, and reaction with fluorescin-tagged antibodies).

C. G. Huff (*Host Influences on Some Haemosporidian Parasites*, pp. 55–79). This interesting paper looks at the problem from an unusual angle, *i.e.*, the effect of the vertebrate or mosquito hosts on malaria parasites. How has immunity for instance influenced them ? Morphological changes occur when the parasite gets into an abnormal host, like *Plasmodium knowlesi* in man, or *P. brasilianum* in howler monkeys; the naturally round gametocytes of *P. relictum* become elongated in ducks, while marked differences in morphology in the tissue stages of avian parasites are found when an abnormal host is substituted for the natural one. Most of these changes are transient, and the number of merozoites which diminishes with the onset of immunity rises later (or in a new host) to normal. Choice of host cell by the parasite is governed by the species of animal concerned (in birds and lizards). An important influence of the host concerns the production of gametocytes either by changing the species of host (when sexual forms may completely disappear) or through

the development of immunity in the same host (often leading to a gradual loss of these forms and of their infectivity to mosquitoes). Continuous blood passage also results in a disappearance of gametocytes. An explanation of this phenomenon is lacking though it is interesting to note that exposure of the parasite to high temperatures resulted in a loss of ability to produce gametocytes. It seems as though it is the development of an active humoral immunity rather than a loss of metabolites in the blood of the host which is responsible for the drop in gametocyte production. Summing up, Huff classifies the changes in the parasite produced by the host into 2 categories, (1) transient morphological or infectivity changes, and (2) lasting effects genetic in character.

L. A. Stauber (*Host Resistance to the Khartoum Strain of Leishmania donovani*, pp. 80–96). 5,000 laboratory animals were infected with *Leishmania donovani*, mostly by intracardiac inoculation, and the course of the disease was compared in the different species of animals. The hamster was completely susceptible and died in 35–45 days after a heavy inoculum or 251 days after a light. The chinchilla behaved in much the same way and the infection was always fatal in this animal. In the cotton rat the infection was extremely heavy, but the animal survived. The mouse was unable to eliminate the parasite from the tissues, even after 3 months, but it acquired some degree of resistance which was more manifest in the gerbil and still more in the guineapig. In the latter animals resistance to superinfection could be demonstrated, but in the chinchilla and hamster (after elimination of the original infection with drugs) no evidence of the acquisition of immunity could be found and death ultimately ensued.

R. M. Lewert (*Invasiveness of Helminth Larvae*, pp. 97–113). Penetration of intact mucosal or epithelial surface by helminth larvae is followed by migration of the parasite through the tissues, and in all these processes an enzymatic mechanism is involved to which the host eventually responds. Some enzymes are proteolytic and collagenase-like in nature as in *Schistosoma* and *Strongyloides*, and these act on the acellular glycoprotein found in the intercellular cement and basement membranes of the tissues. This material varies in its resistance to the enzymes, becoming less soluble with age and in gonadal hormone changes, while the host itself may produce anti-enzymes such as anticollagenase, which are present in the alpha globulin fraction of the serum and are thus not antibodies of the usual sort.

J. Oliver-Gonzalez and E. Koppisch (*Immunological and Pathological Phenomena related to Substances from Tissues of Ascaris lumbricoides*, pp. 141–150). These authors describe experiments which neatly demonstrate the toxic action of the different organs and tissues (cuticle, muscle, intestine, sperm, egg and coelomic fluid) on dogs, guineapigs and mice. The symptoms and tissue changes were indistinguishable from those produced by anaphylactic shock. The toxic agent was not a pure substance, and its chemical constitution is unknown. It is easily extracted

with a buffer of *p*H 8·9. This substance is related to the A2 isoagglutinogen of human erythrocytes and it causes intravascular agglutination of erythrocytes when inoculated into dogs.

I. G. Kagan (*Contributions to the Immunology and Serology of Schistosomiasis*, pp. 151–183). This clear paper summarizes and classifies the immunity picture of two species of schistosomes (*Schistosomatium douthitti* and *Schistosoma mansoni*) as studied particularly in white mice and rhesus monkeys. Innate immunity is first considered and then acquired immunity, either active (after natural or artificial infections) or passive (such as congenital or produced by the inoculation of immune serum). Serological tests to demonstrate immunity are described, including complement fixation (best obtained by using a lipo-protein antigen from adult worms), precipitin (with stage specific antibodies), circumoval precipitin (especially useful in chronic infections and for evaluating therapy), *cercarienhüllen* reaction (which has great biological interest but is non-specific), flocculation, agglutination, haemagglutination, miracidial immobilization (highly sensitive) and skin tests such as the Prausnitz-Küstner reaction (based on passive immunity in a local area of the skin). All these tests are still in the formative stage and will probably be improved when metabolic antigens are employed.

. N. A. Stoll (*The Induction of Self-Cure and Protection, with Special Reference to Experimental Vaccination Against Haemonchus*, pp. 184–208). Experiments are described in which bottle-raised lambs were given *Haemonchus contortus* larvae (exsheathed and sterilized) either by intraperitoneal or by subcutaneous injection and were later challenged by oral administration of the larvae. Most of these animals showed resistance to a high degree. Another experiment was performed on a Guernsey bull calf injected parenterally with similar larvae of sheep origin, by administering a huge dose of larvae by mouth 6 weeks later and comparing the resultant infections with those in an unvaccinated control; severe symptoms arose in the latter and 839 *Haemonchus* were found at autopsy while symptoms were minimal in the former and only 160 worms were found. *P. C. C. Garnham*

Nitzulescu, V. **Elemente de parazitologie.** [Elements of Parasitology]

This book was reviewed on p. 111.

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

See also p. 258, Krampitz, Über das heutige Sizilien in hygienisch-zoologischer Sicht. [**Current Zoological Problems related to Health in Sicily**]

Prieto Lorenzo, A. Los artrópodos vectores de enfermedades infecciosas y parasitarias en el hombre. [**Arthropod Vectors of Human Infections and Parasitic Diseases**] *Med. Trop.* Madrid. 1958, May–June, v. 31, Nos. 5/6, 426–55; July–Aug. & Sept., v. 32, Nos. 1/2 & 3, 29–76; 139–93, 38 figs. [19 refs.]

Goma, L. K. H. **The Productivity of various Mosquito Breeding Places in the Swamps of Uganda.** *Bull. Entom. Res.* 1958, Sept., v. 49, pt. 3, 437–48. [11 refs.]

The productivity of a number of selected breeding places in papyrus swamps was investigated at Bukasa Swamp, on the shore of Lake Victoria, and at Lubigi Swamp, near Kampala, Uganda. The method used was to trap larvae in a wooden sampler, 41 × 40 × 18 cm., open at both ends, and then to bale out a standard sample of the water. All the mosquito larvae were then collected from the sample, sorted, and identified. The method did not record the larvae of certain genera, such as *Taeniorhynchus*, and also in deeper water the sampler floated and did not touch the bottom. Six types of vegetational area were studied, (1) freshly cut papyrus, (2) papyrus cut some time previously, (3) freshly burnt papyrus, (4) papyrus burnt some time previously, (5) virgin or regenerated papyrus, and (6) the swamp periphery. Chemical analyses were made of water samples from all 6 habitats. Differences were found between the habitats in the amounts of salts, ammonia and organic matter, but the *p*H in all of the vegetational areas was found to be variable.

17 species of mosquito were studied, including *Anopheles funestus* and *A. coustani*, but *A. gambiae* was not found. The dominant species were *Culex guiarti*, *C. univittatus* and *C. rubinotus* (78% of a total of 5,781 larvae). The peripheral area of the swamp, containing permanent and semi-permanent pools, was found to be the most productive. The least productive areas were the two areas of burnt papyrus. Only one species, *Culex tigripes*, was found in all 6 habitats, while *Anopheles funestus*, *Culex grahami*, *C. guiarti* and *Ficalbia malfeyti* were found only in the peripheral area of the swamp, and *Ficalbia mediolineata* and *F. plumosa*

were restricted to the freshly cut papyrus area. The other species showed preferences for different areas of the swamp. None of the species showed a preference for old burnt papyrus, but this part of the swamp showed a species association closest to that of the peripheral zone.

The main purpose of the study was to investigate the effect of man's activities on mosquito breeding. In this connexion the larval population of freshly cut papyrus was found to be twice that of virgin or regenerated swampland. Generally the least productive habitats were those containing the smallest quantity of organic matter. *B. R. Laurence*

Fox, I. **The Mosquitoes of the International Airport, Isla Verde, Puerto Rico, as shown by Light Traps.** *Mosquito News.* 1958, June, v. 18, No. 2, 117–24, 5 figs.

Rapid building developments in and around the Puerto Rico International airport have not been attended with control measures directed at the mosquito breeding sites in extensive areas of saltmarsh. In a 2-year light trapping programme 176,053 mosquitoes were caught and identified and the abundance of the species caught related to the light-trap positions. The most numerous species was *Aëdes taeniorhynchus*, followed by *Uranotaenia lowii* and *Deinocerites cancer* and *Anopheles albimanus* in order of abundance. Altogether 26 species were recorded. Correlation of peak catches with summer months' rainfall was noted with some species. The author concludes that the local mosquito problem is more one of nuisance value than that of disease vectors. *E. R. Nye*

Colless, D. H. **Relationship between Certain Biological Constants and Trophic Condition in Mosquito Populations.** [Correspondence.] *Nature.* 1958, Oct. 4, v. 182, 951–2.

By assuming that a population of mosquitoes is in a steady equilibrium the author has developed two equations; one for the proportion of the population which has fed or is gravid:

$$\frac{p^n - p^{n+d}}{1 - p^c}$$

and another for the proportion of the population which is unfed:

$$1 - \frac{p^n(1 - p^d)}{1 - p^c}$$

where p = the daily survival rate, n = days from hatch to first feed, d = days developing eggs, up to first oviposition, f = days from oviposition to next feed, and c = d + f. [It is assumed that the oviposition cycle will be repeated every c days.]

The two formulae can be used to calculate, from a knowledge of the gonotrophic cycle, the survival rate, p, and the method has been tested

with 4 Malayan species of *Culex*. The calculated survival rate was found to correspond closely with survival rates estimated by other methods. It is suggested that the formulae may be useful in following alterations in the survival rate of mosquitoes during mosquito control campaigns. [See also this *Bulletin*, 1952, v. 49, 569; 813; 1955, v. 52, 121.]

B. R. Laurence

Bhatia, M. L. & Wattal, B. L. **Preliminary Observation on Viability of Submerged Eggs of Mosquitoes.** *Indian J. Malariology.* 1958, Mar., v. 12, No. 1, 1–12, 3 graphs.

The eggs of *Aëdes aegypti*, *Culex fatigans*, *Anopheles annularis*, *A. culicifacies*, *A. stephensi* and *A. subpictus* were submerged under water for periods of up to 96 hours at temperatures between 18° and 30°C. The percentage of eggs that hatched generally decreased with the length of submergence and the most consistent results were obtained with *C. fatigans*, where no eggs hatched after submergence for 24 hours at 25°–29°C., and for 48 hours at 20°C. *Aëdes* eggs (8–12 hours old) hatched after submergence for 96 hours, and *Anopheles* eggs hatched after submergence for 24 hours. Eggs of *A. subpictus* (8 hours old) hatched after submergence for 96 hours at 18–20°C. The first stage larvae of *Aëdes* and *Anopheles* were able to emerge from eggs submerged under water, but in *Culex* only those eggs which were refloated at the surface appeared to be viable. *B. R. Laurence*

Mellanby, K. **The Alarm Reaction of Mosquito Larvae.** *Entomologia Exper. et Applicata.* Amsterdam. 1958, Aug., v. 1, No. 3, 153–60. [14 refs.]

The larvae of *Aëdes aegypti* are normally lighter than water and, when alarmed, descend from the water surface by active swimming. *Culex molestus* and *Anopheles maculipennis* larvae are heavier than water and, when alarmed, detach from the surface and sink. Continual stimulation, by tapping a vessel containing *Aëdes* larvae once a second for four minutes, did not maintain the alarm reaction, and by the end of the period the larvae had returned to the surface film. A different stimulus, by passing a hand over the vessel, then produced an immediate alarm reaction. The larvae cease to react because of " stimulus satiation " and not fatigue. Illumination from below produced a stronger negative reaction to the light than to disturbance by tapping in *Aëdes*, but not in *Anopheles* or *Culex*. Larvae that were chilled began to revive several degrees below the temperature at which the alarm reaction was restored. This alarm reaction temperature may possibly be considered to be the lowest temperature at which behaviour is " normal ". *B. R. Laurence*

Rahm, U. Die attraktive Wirkung der vom Menschen abgegebenen Duftstoffe auf *Aedes aegypti* L. [**The Attractive Effect of Human Odours on** *Aëdes aegypti*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 2, 146–56, 8 figs. [16 refs.]

In a previous paper [this *Bulletin*, 1957, v. 54, 501] the author described a cage test for comparing the attractiveness, to female *Aëdes aegypti*, of hands and arms of various human subjects. He showed that warm moist dummy arms were also attractive, but nearly always less so than real ones, and suggested that skin odour was responsible for the difference. In the present paper he uses a modification in which warm moist air is blown through two chambers in which hands of subjects can be inserted, and thence into the two sides of the chamber. By balancing the temperature and humidity, the mosquitoes are made to respond to differences in odour alone.

The results show fairly consistent differences in attractiveness to *A. aegypti*, especially a difference between sexes; men are nearly always more attractive than women. In responding to the stimulus, the mosquitoes fly against the air stream and rest on the gauze-covered entry ports. *J. R. Busvine*

Singh, K. R. P. & Micks, D. W. **Effects of Growth of** *Aedes aegypti* **L. Larvae on a Chemically Defined Medium.** *Mosquito News.* 1958, June, v. 18, No. 2, 59–63, 5 figs.

Insects reared on an artificial medium produce alterations in that medium by the addition of metabolites. Using *Aëdes aegypti* the authors studied the changes, in a chemically defined medium, of viscosity, surface tension, osmotic pressure and amino-acid levels as measured by a chromatographic method. Changes in these factors were noted; surface tension varied but remained within the limits within which most species develop [this *Bulletin*, 1957, v. 54, 1474]; there was a steady increase in osmotic pressure and this is considered as probably the most important limiting physical factor. *E. R. Nye*

Mahfouz, M. S. Die Wirkung einiger Insektizide auf die Larven von *Aedes aegypti* L. [**The Effect of Several Insecticides on the Larvae of** *Aëdes aegypti*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 2, 156–62, 1 fig.

Results are reported of insecticide tests with fourth stage larvae of *Aëdes aegypti* from the Hamburg Tropical Institute. This colony, kept in the laboratory for several decades, stemmed originally from a mixture of African and South American stock.

The LC50s of the following insecticides were experimentally determined: chlorthion 0·014 p.p.m.; Diazinon 0·019 p.p.m.; dieldrin 0·032

p.p.m.; malathion 0·130 p.p.m.; Dipterex (Bayer L 13/59) (0.0-dimethyl-2.2.2, trichlorethyl-thiophosphate) 0·165 p.p.m.; DDT 0·175 p.p.m.

The author calls attention to the fact that in some experiments with DDT, the variation between replicates exceeded the normal limits.

R. J. Wood

Chu, Feng-I. **Advances in the Study of Culicine Mosquitoes of Hainan, South China.** *Indian J. Malariology.* 1958, June, v. 12, No. 2, 109–13, 5 figs.

This paper brings up to date the recorded species of megarhine and culicine mosquitoes of Hainan Island and altogether 69 named species and their varieties are listed. In addition there is a translation of the description of *Culex* (*Mochthogenes*) *hinglungensis* by Chu (*Acta. Zool. Sinica*, 1957, v. 9, 145), the male hypopygium of which species is figured.

E. R. Nye

Bertram, D. S. & Samarawickrema, W. A. **Age Determination for Individual *Mansonioides* Mosquitoes.** *Nature.* 1958, Aug. 16, v. 182, 444–6, 2 figs. [11 refs.]

Methods for determining the age of anopheline mosquitoes by dissection of the ovaries have been reviewed in this *Bulletin* recently by Gillies, who has translated the relevant Russian literature [this *Bulletin*, 1958, v. 55, 713]. The culicine mosquitoes *Mansonioides uniformis* and *M. annulifera*, reared in the laboratory, have now been shown to form corpora lutea after each oviposition (up to a maximum of 6 corpora lutea recording 6 ovipositions in *M. uniformis*). The ovaries are dissected out in 0·9% saline. When the length of the gonotrophic cycle is known, the age of the mosquito can be calculated from the number of corpora lutea per ovariole. In *M. uniformis* the period from one oviposition to the next is about 4 days, and a close agreement was found between the known age of the females and the age calculated by dissection. *B. R. Laurence*

Ware, G. W. & Roan, C. C. **The Interaction of Piperonyl Butoxide with Malathion and Five Analogs applied topically to Male House Flies.** *J. Econom. Entom.* 1957, Dec., v. 50, No. 6, 825–7. [12 refs.]

A few years ago it was found that several substances used as pyrethrum synergists had appreciable effects on the toxicity of organo-phosphorus compounds to flies and lice [Hoffman *et al.*, this *Bulletin*, 1954, v. 51, 1312]. More recently there have been further reports of antagonism as well as synergism. The authors have investigated the action of piperonyl butoxide on the toxicity of malathion and 5 analogues to male house-flies. Treatments were made by individual topical application of acetone

solutions, either of toxicant alone or together with 10 times its weight of piperonyl butoxide.

The results showed that the toxicity of some analogues was increased up to twice, while other compounds (including malathion) were rendered less toxic (up to half original potency) by the additive. The reason is unknown, but the authors are now investigating the effects of piperonyl butoxide on penetration of malathion-type insecticides through fly cuticle.

J. R. Busvine

See also p. 224, Pampiglione, Indagine epidemiologica sulla miasi congiuntivale umana da *Oestrus ovis* in Italia. Nota I: Inchiesta tra i medici italiani. [**Epidemiological Enquiry on Conjunctival Myiasis due to *Oestrus ovis* in Italy. I. Enquiry from Italian Doctors**]

Hoogstraal, H. & Kaiser, M. N. **The Ticks (Ixodoidea) of Egypt: A Brief Review and Keys.** *J. Egyptian Pub. Health Ass.* 1958, v. 33, No. 3, 51–85. [Numerous refs.]

Designed primarily for the identification of Egyptian ticks, this paper includes notes on native ticks (31 species) and their principal hosts as well as a list of introduced species and keys covering both. A note at the end of the paper deletes *Argas reflexus* from the Egyptian list.

E. R. Nye

Kumada, N. *Neopsylla specialis japonica*, **a New Subspecies of Flea from South-Western Japan (Siphonaptera: Hystrichopsyllidae).** *Bull. Tokyo Med. & Dental Univ.* 1958, Mar., v. 5, No. 1, 41–7, 8 figs. (6 on 3 pls.)

Sasa, M. & Shingai, H. **Occurrence of the Mite** *Dermatophagoides scheremetewskyi* **Bogdanoff, Free-Living in Albumine Tannate stored in Dispensaries.** *Japanese J. Exper. Med.* 1958, Feb., v. 28, No. 1, 1–10, 10 figs. [11 refs.]

Dermatophagoides scheremetewskyi is a mite first described in 1864 from human skin and (in Moscow) causing sometimes severe dermatitis. In the past 10 years it has been reported from Japan, cities in the U.S.A., and in the U.S.S.R., with a record in 1926 from inhabitants of a Polynesian island. It has been found in human sputum and urine, and from patients with dermatitis, besides on the bodies of rodents (including domestic) and bats, a bird's nest, in cereal food of a monkey and in houses.

The present records concern its occurrence in Nagaoka City, Japan, in " albumine tannate " (tannalbin) powder in several hospital dispensaries and stores, and a pharmacist's shop; it occurred in sealed packages from different manufacturers and in packets open and in use.

This paper describes the detailed anatomy of the female, male, nymph and larva; there are 10 line drawings to amplify the text. The descriptions provide the basis of a comparative study of *D. scheremetewskyi* and a free-living acarine, *Tyrophagus dimidiatus*. This parasitic mite appears to be intermediate morphologically between free-living acarines and the parasitic sarcoptid mites which it resembles in general features. The life cycle is yet to be worked out fully. *D. S. Bertram*

Brown, A. W. A. [Ph.D.] **Insecticide Resistance in Arthropods.** *World Health Organization Monograph Series No. 38.* 240 pp., 29 figs. 1958. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [25s.; $5.00; Sw.fr. 15.–.]

Two years ago a committee of the World Health Organization pointed out that problems of insecticide resistance are growing faster than our ability to cope with them. This steady increase has reached a stage when, says Dr. Brown, " the only genera in the field of medical entomolgy for which resistance has not yet been reported are *Simulium*, *Phlebotomus* and *Glossina* ". [If one excludes ticks and mites, this is virtually true, though admittedly some of the reports have not been confirmed.] Naturally, the subject has attracted considerable attention. The basic observations have been published in about 650 papers during the past decade and there have been some 40 reviews of the subject. Dr. Brown's review is substantially larger than any other, running to 240 pages and allowing very thorough treatment of different aspects of the problem. First, there is a 29-page chapter on the " Nature and Characterization of Resistance ", describing tests for resistance and their significance. Chapter 2 (62 pp.) deals with resistant strains of insect species from " Taxonomic Groups characteristically Vectors to Man ". (Most of these are mosquitoes.) Chapter 3 (83 pp.) concerns " The Housefly " and Chapter 4 (23 pp.) describes resistance in " Taxonomic Groups characteristically not Vectors to Man ".

The discussion of specific cases of resistance in the last three chapters deals first with the nature of the evidence for resistant strains and also with the geographical distribution of the pest and of the incidence of resistance. This information will be found particularly valuable by medical administrators, malariologists and public health authorities who want a clear picture of the threat offered by resistance to control of particular diseases.

Apart from this information, the various basic research investigations are summarized, presumably for the benefit of research workers. This should indeed be very helpful to them. Dr. Brown's unrivalled knowledge of the subject has enabled him to bring together facts from unexpected sources and provide helpful interpretations of the phenomena. These are most stimulating, even when one does not agree with him in every respect. Logically it might be expected that speculations on the

nature of resistance mechanisms should be transferred to a general section, rather than being appended to the particular insect species. But the overwhelming amount of data on house-fly resistance would have seriously biased this arrangement.

It only remains to note that the printing and reproduction are of the usual high standards of WHO monographs. *J. R. Busvine*

Bami, H. L., Cheema, L. S. & Dhatt, M. S. **Studies on Particle Size Distribution in relation to Dispersibility. Part II. 75 per cent D.D.T., 50 per cent B.H.C. and 50 per cent Dieldrin Water Dispersible Powders.** *Indian J. Malariology.* 1958, Mar., v. 12, No. 1, 49–56, 6 graphs.

The authors have been investigating the physical properties of commercial formulations of insecticides; these comprised foreign samples of 75% DDT and 50% dieldrin and Indian samples of 50% BHC, all prepared as wettable powders. All the products complied with the WHO and Indian standard specifications of suspensibility. The authors further investigated the particle size and suspensibility of the main ingredients, before and after accelerated tropical storage.

They found that the clay used as diluent was very fine and suspendable. After admixture with insecticide, it showed some larger particles due to agglomeration, but it was still fine and scarcely affected by tropical storage. Of the insecticides, the DDT was finest, but all products had at least 50 and 70% of their particles below 10 and 20 microns respectively. Tropical storage caused greater agglomeration of DDT than of dieldrin, probably owing to its lower melting point; but all samples were satisfactory (by WHO and Indian standard specifications) after storage. *J. R. Busvine*

LABORATORY PROCEDURES

Jeska, E. L. & Gentzkow, C. J. **Staining Fecal Protozoa after Fixation in Formalin.** *Amer. J. Clin. Path.* 1958, Feb., v. 29, No. 2, 184–5.

The authors describe a method whereby formalin-fixed protozoa in faecal specimens adhere to the slide and can be stained satisfactorily. The faeces are first concentrated by the Ritchie ether-formalin sedimentation technique, then the sediment is mixed with saline and re-centrifuged, after which the supernatant fluid is discarded. The sediment is fixed for 10 minutes in 3 times its volume of heated Schaudinn's fluid, and centrifuged again, after which the fixative is poured off and the sediment is drained. The slides are first coated with Mayer's albumin, then the faecal material is spread over the film, and the slides are placed in 70%

alcohol tinted with iodine. Finally the smears are mordanted in ferric alum and stained with haematoxylin. *C. A. Hoare*

MISCELLANEOUS PAPERS

Griffiths, J. F. **Climatic Zones of East Africa.** Reprinted from *East African Agric. J.* 1958, Jan., v. 23, No. 3, 179–85, 1 map.

Awad, N. A. **Urinary 17-Ketosteroid Excretion, Blood Eosinophil Level and Adrenocortical Function in Adult Male Egyptians.** *J. Trop. Med. & Hyg.* 1958, Aug., v. 61, No. 8, 204–9, 1 fig. [31 refs.]

In 18 male Egyptians (mean age 32) the mean urinary total 17-ketosteroid output per 24 hours was 8·9 ± 1·20 mgm. (The figure for 11 Europeans of the same age-group was 13·9 ± 1·20 mgm.)

In 10 Egyptians during intramuscular administration of corticotrophin, the output rose to 13·0 ± 1·88 mgm. per 24 hours. 4 to 6 days after the cessation ["beginning" in text] of the corticotrophin administration it fell to 9·5 ± 1·70 mgm. per 24 hours. The corresponding figures for blood eosinophils were 102 ± 28·1 and 189 ± 55·2 cells per cmm. (The initial figure was 224 ± 58·5).

These responses to corticotrophin are normal. *B. G. Maegraith*

Vervoorn, J. D. **Some Data about the Sterility of Male Africans in Ghana.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 256–60. [14 refs.]

Benoist, J. Stature et corpulence à la Martinique. Données anthropométriques globales et incidence des conditions sociales. [**Stature and Body Weight in Martinique. Anthropometric Data and Incidence of Social Conditions**] *Arch. Inst. Pasteur de la Martinique.* 1958, July–Oct., v. 11, Nos. 3/4, 97–103, 1 chart.

REPORTS AND SURVEYS

Lisbon. **Sixth International Congresses on Tropical Medicine and Malaria, Instituto de Medicina Tropical, 5th–13th September 1958. Abstracts of the papers.** 346 pp. 1958. Lisbon: Tipografia Mourão, Lda., Largo do Conde Barão, 50–1°.

The scope of these Congresses has grown very noticeably since the third series held in Amsterdam in 1938. The present series comprised sections

on industrial hygiene, the anaemias, gastro-intestinal diseases, the mycoses, physiology, sanitary engineering, parasitology, the zoonoses, and vital statistics, in addition to those covered at the Amsterdam meeting.

The emphasis has obviously shifted also, particularly of course because of the new antimalarial and other drugs, and the insecticides, and instead of control of malaria we now talk of eradication, though we have rediscovered resistance. But we have also been forced to take another look at the animal reservoirs of human disease because we now know that *Loa loa* and the Pahang strain of *Wuchereria malayi* (which it now regarded as a separate species, *W. pahangi*) are not the simple parasites of man we once thought them, and members of the Kenya team led by R. B. Heisch have at last infected man with a polymorphic trypanosome (presumably *T. rhodesiense*) isolated from a bush-buck. In fact the definition of the word zoonosis occupied much attention and generated some warmth until it was more or less accepted as meaning infections of man naturally acquired from other vertebrates.

The Lisbon Congresses were so wide in interest that it was quite impossible for anybody to attend more than one-quarter of the meetings. At each session 4 sections met simultaneously, and there were 3 sessions each day. The volume containing abstracts of the papers presented runs to 337 pages of text—and the abstracts are mostly quite short. Eventually, no doubt, the full text will be published, and it will be a remarkable conspectus of modern practice and opinion.

Congresses of this kind are not usually appropriate for the announcement of new discoveries, and most of the papers were, in fact, summaries of work already published, or reviews of recent trends, but there were some new features, for instance the suggestion of Professor J. J. C. Buckley that the *Wuchereria* species of the *malayi* group should be placed in a new genus *Brugia*.

In the Congress on Tropical Medicine the first subsection, on schistosomiasis, held 3 sessions. Much work on snails was reported (for instance by L. J. Olivier and F. S. Barbosa, E. T. A. Malek, D. L. Augustine and his colleagues, A. P. Szumlewicz, and F. E. C. Gomes and his colleagues), but perhaps the most important fact is that, according to C. A. Wright, traditional methods in malacology have produced some order out of the taxonomic chaos which has for so long retarded progress in the study of schistosomiasis. There were papers on the penetration of cercariae into the skin, on clinical findings and treatment, and on various methods of control of snails.

In the subsection on filariasis W. E. Kershaw repeated observations already reported which suggest that many of the blinding lesions observed in onchocerciasis areas of Africa may not, in fact, be due to that infection, and emphasized the importance of further research. In Malaya the work which led to the discovery of the Pahang strain of *W. malayi*, its reservoir in cats and monkeys and its association with fresh-water swamp forests, was briefly described by T. Wilson, and by

J. F. B. Edeson and R. H. Wharton, who commented on the implications of an animal reservoir as an impediment to control. Papers on transmission, clinical matters, treatment and relevant animal experiments in filariasis were also contributed by workers from many parts of the world. Other worms received rather less attention.

In the section on trypanosomiasis the chief item of news was the infection of man with *T. rhodesiense* from a bush-buck, as noted above, and the rest of the African work was an extension of research on familiar lines, though the paper by J. Ford on reclamation of land from tsetse flies, and its development, turned more towards the statesman's attitude than to the elucidation of any point of technique or research. Chagas's disease received much attention, but here again the papers were on the usual lines—cardiopathy, biology of the vector bugs and studies of *T. cruzi*.

Amoebiasis is still full of difficulties. R. A. Neal discussed the finding that *Entamoeba histolytica* from patients with dysentery are invasive whereas those from carriers are not, and he suggested that the invasive forms may arise from the non-invasive amoebae by a process of adaptation. On the other hand, E. C. Faust and L. E. Giraldo found that strains derived from the general population in Colombia were virulent for guineapigs, and they think that these strains usually live harmlessly in man in association with intestinal bacteria and the starch grains present in the intestinal contents of these people, who take a predominantly carbohydrate diet. They invade the intestinal wall only occasionally.

Leishmaniasis also remains an enigma, and M. H. Sati described an epidemic of kala azar in part of the Sudan where it had not been known in the recent past; transmission may have been partly mechanical, with Tabanidae and *Stomoxys calcitrans* as vectors. The possibility of an animal host is constantly borne in mind.

In Brazil leishmaniasis is a rural or semi-rural disease, but the epidemiology is related to sandflies, and dogs and field rodents are reservoirs (S. B. Pessoa, L. M. Deane).

S. Adler discussed oriental sore, and concluded that races of *Leishmania tropica* differ in infectivity for the various species of sandflies.

In the section on bacterial diseases, B. Cvjetanovic referred to recent extensive trials of TAB vaccines in Yugoslavia, where an alcoholized vaccine, with a high content of Vi antigen, was much inferior to a heat-killed phenolized vaccine with a much lower Vi but a higher H and O antigen content.

The question of pathogenicity arose in relation to *Escherichia coli* (G. Varela, A. C. Hernandez, J. Luder) and the cholera vibrio, for which several factors may be involved, including the *p*H of the gastro-intestinal contents, the intestinal flora and the quality of the diet.

B. A. Dormer considers tuberculosis to be the greatest public health problem in the tropics, and control may depend largely on treatment being given to all persons suspected of it; the basic drug is isoniazid, to

be given in doses as large as can be borne. BCG is also important, and the mitigation of environmental stress is vital. J. Lauckner and A. L. Valensi each made the point that ambulatory treatment must be practised widely in tropical countries. J. Pepys reported trials of various drugs in East Africa; isoniazid and PAS were good, DDS useless, and thiosemicarbazone useful (with isoniazid) in preventing isoniazid resistance.

F. Contreras discussed the epidemiology of leprosy, and A. Beltran its control, both stressing the importance of early diagnosis and treatment.

In the section on spirochaetal infections interest was shown in the animal hosts of leptospires and the epidemiology of that infection, and in the newer tests for syphilis. There were accounts by F. S. Cruz Ferreira and F. N. Guimarães of the control of yaws.

Fungus diseases are attracting increasing attention, and the systemic mycoses of South America were described by C. S. Lacaz, histoplasmosis in Africa by R. Vanbreuseghem and E. Drouhet, and the tineas of Africa by A. S. Leite. P. Abbott, from an extensive experience in the Sudan, related the incidence of mycetoma to climatic conditions rather than to specific soil types, P. Destombes described the pathology of this disease, and F. Mariat discussed the fungi responsible for it. There were many contributions on the various fungi themselves, and their biochemical reactions, and also on the natural history of histoplasmosis and coccidioidomycosis, which have engaged much interest in recent years.

The sections on viruses were most informative, and attracted large audiences. The size of the problems facing the virologists was indicated by A. B. Sabin when he remarked that the number of known arthropod-borne viruses is now over 70. The fact that these arborviruses may complicate the pattern of immune response in sera investigated in yellow fever areas was mentioned by J. B. Manrique and W. G. Downs. C. E. Gordon Smith stated that apparent dengue antibodies have been found in forest and domestic animals in Malaya, but it is not certain that they correspond to the human infections. According to W. Hammon and his colleagues a new and serious haemorrhagic disease of children in the Philippines may be serologically related to dengue, and the infective agents seem to bear this out, though their status is as yet uncertain. Phlebotomus fever is endemic in the Nile area, though R. M. Taylor found a spotty distribution of positive sera.

Tick-borne spring–summer encephalitis is found in forest regions in Asia and eastern Europe, and A. Smorodintsev and V. Ilienko defined 2 forms, one (paralytic) transmitted by ticks, and one (meningo-encephalitic) transmitted not only by ticks but also *via* the alimentary tract from the milk of infected goats. A killed formol vaccine is effective.

In India the recently recognized Kyasanur forest disease has been shown to be due to a virus of Group B similar to but not identical with that of Russian spring–summer encephalitis, and this has been isolated from ticks (*Haemaphysalis*) and monkeys; T. H. Work explained that there are indications that rodents and birds are also implicated.

The enteric viruses are widely distributed in tropical countries, but at the meeting of the section dealing with them the chief interest was in the reports of work done in the various temperate countries, and poliovirus was the centre of attraction.

The respiratory viruses also received attention, and R. J. Huebner noted that at least 6 clinically separate illnesses are caused by the adenoviruses:— acute respiratory disease (serotypes 3, 4, 7 and 14), pharyngoconjunctival fever (commonly 3 and 7a), acute febrile pharyngitis (1, 2, 3 and 5), follicular conjunctivitis (commonly 3 and 7a), epidemic keratoconjunctivitis (8), and virus pneumonia (1, 3, 4, 7 and 7a).

The subsection on rickettsial diseases was opened by J. C. Snyder, who began his paper on Brill's disease with a reference to the plague of Athens described by Thucydides, which MacArthur [this *Bulletin*, 1955, v. 52, 524; 1958, v. 55, 1211] has diagnosed as louse typhus. Snyder agrees with this, having as additional evidence presented to a Greek scholar the sort of terminology that would be used in English to describe the disease, and asking what would be the likely Greek equivalents; the result was a language very much like that used by Thucydides. J. R. Audy reported his observations on the epidemiology of scrub typhus, R. B. Heisch discussed the possible differences between the rickettsiae of tick typhus in various parts of Africa, and P. Zdrodovski and H. Golinevitch the tick typhus of far-eastern U.S.S.R. which is due to the organism they recognize as *Dermacentroxenus sibiricus*.

P. Giroud and J. Jadin summed up their ideas on the neo-rickettsiae of Africa, a group of organisms measuring 200–300 mμ, and regarded as related to the viruses of the psittacosis group. They have been isolated in laboratory animals, fowl embryo and tissue culture, and convalescent serum neutralizes their cytopathogenic action; they are not identical with the psittacosis viruses.

J. A. Montoya and his colleagues reported that immunization against typhus with the non-virulent strain E has been applied in the field in South America, but that the results did not provide the desired evidence, though previous studies had indicated good immunity to *R. prowazeki* and some immunity to *R. mooseri*.

In the subsection of physical environment S. Robinson and C. S. Leithead discussed acclimatization to heat in hot countries, and F. H. Bonjer and G. P. Crowden related their work to heat stress in industry, the latter particularly mentioning the control of re-radiated solar heat from walls and ceilings, and the use of artificial evaporative cooling in industry. W. S. S. Ladell defined anidrotic heat exhaustion as fundamentally an endocrine disorder, and W. P. Stamm discussed the difficulties of classification of the heat disorders.

The subsection on nutrition concentrated chiefly on kwashiorkor and the problem of protein malnutrition, and papers on these were presented by J. Waterlow, F. Walt, O. Bassir, O. A. Roels, B. S. Platt, J. A. A. C. Ribeiro and others, while L. van den Berghe reported his

work on experimental kwashiorkor in pigs. A paper of particular interest, by K. Hill, related to the veno-occlusive disease of children, which is thought to be due to constituents of "bush tea" or to food containing the pyrrolizidine group of alkaloids (found in *Senecio* and *Crotalaria*). It has been reported in animals.

The subsection on anaemias attracted a great deal of attention. Techniques were described by C. Trincão, by G. H. Beavan and J. C. White, and by J. Jonxis, and general statements of geographical distribution were contributed by H. Lehmann and A. R. Nogueira. The pathological changes resulting from haemoglobin C and S, respectively, were described in general terms by R. J. Cabannes and L. W. Diggs. But although the abnormal haemoglobins were so much in the picture, the importance of diet and of infections in the aetiology of tropical anaemias was stressed by A. W. Woodruff.

Most of the work of the Congress related to the aetiology, transmission and control of the various diseases, and an impression could have been formed that whereas the study of parasites and their vectors, of environmental factors and human biochemical reactions had been pressed everywhere with imagination and vigour, the study of man himself, and his activities and beliefs and understanding, had largely been ignored. To illustrate the point one may refer to a recent paper by Chakravarty *et al.* [see above, p. 202] describing the anomaly of infant scurvy in a great orange-growing centre of India. It seems to be true that as standards of living improve the diseases which cause so much disability in tropical countries tend to die out, for reasons, which, no doubt, are closely associated with changes in education and cultural background. The contributors to the subsection on sanitary education touched on this important aspect of control of disease—H. de Hollanda, for instance, in relation to schistosomiasis, O. A. Ajose in relation to the African environment as a whole, and J. R. da Silva, T. V. Tiglao and D. Martins in relation to the education of sanitary personnel—but there seems to be room for few more advanced and comprehensive anthropological studies than were reflected at this Congress. A tentative statement of one of the great human problems was indeed made by R. K. Macpherson, who, in a paper on industrial hygiene, commented on the profundity of the change from small-scale agriculture to large-scale industry, and on the need for psychological guidance, and there was an important paper by H. Collomb on psychiatry in southern Sahara and its relationship to changing cultural patterns, but the subject deserves much more attention than it seems to receive.

The subsection on housing in hot climates had a bearing on these questions. J. M. Fraser, for instance, described housing in Singapore where the population is very dense, and G. A. Atkinson commented on the shack communities which spring up near large cities. In such conditions the protection of health becomes a matter not for the doctor directly but for the administrator who should control the industrial scene and use

legislation as a means of safeguarding health, though the stimulus should come from the doctor who sees the results of haphazard development.

The subsection on the zoonoses produced some vigorous discussion on the definition of the term, as indicated above, but some of the papers related not to zoonoses but to diseases of animals unrelated to man.

One of the greatest difficulties in tropical countries is the collection of vital statistics, and several speakers (F. A. Assaad, H. B. L. Russell, Y. Biraud, D. Scott) spoke of the value of surveys and mobile teams in gathering this kind of information, and R. Mochtar reported a population study of Djakarta. B. B. Waddy described the effects of epidemic cerebrospinal fever, trypanosomiasis and onchocerciasis on the population of the savannah country of north-west Ghana. Cerebrospinal fever, though widespread and severe, apparently had little effect on the pattern of population, but trypanosomiasis resulted in complete depopulation of some areas in the early days, and onchocerciasis drove the people away from the rivers on to the watersheds, which eventually became eroded by farming, and uninhabitable. Control of this disease is essential.

The subsection on free communications related largely to cardiovascular, hepatic, nutritional and other diseases, including a favourable account of the treatment of trachoma with spiramycin (M. H. Berner), and of pemphigus foliaceus with hydrocortisone (A. A. Xavier, J. F. da Cunha and R. P. de Mello). H. Hoogstraal and M. N. Kaiser made the point that by team work and close correlation of systematic and biological studies, taxonomic problems of the genus *Hyalomma* can readily be solved, and in this way epidemiological evaluation becomes more certain and control more economical. This probably applies very widely, and the authors' thesis is for planned and collaborative research rather than multitudinous haphazard observations.

An interesting note on the history of yellow fever in South and Central America was contributed by M. E. B. Vasconcelos, who referred to the ancient records of the Maya people which mention outbreaks of a fatal disease characterized by jaundice and the vomiting of blood, and relate them to monkeys. These records go back as far as the years 1342–1362, and the author comments that they obviously refer to jungle yellow fever, which after the appearance of *Aëdes acgypti* and the dramatic urban outbreaks, was for many years forgotten.

The Congress on Malaria opened with a section on parasitology in which various studies on the parasites of birds, and *P. berghei*, were reported. One of the most important contributions was that of R. S. Bray who has been able to establish all phases of all 4 human malaria parasites in splenectomized chimpanzees, and the liver phases of all 4 (and the blood phase of *P. malariae*) in whole chimpanzees. This work has allowed closer study of these parasites than was formerly possible. Ann Bishop studied the production of resistance to metachloridine in clones of *P. gallinaceum*, concluding that resistance was a stable character which could be due to selection of a mutant with a frequency of less than 1 in 5×10^7 parasites.

In the clinical section B. G. Maegraith summarized his work on physiological developments in malaria, including shock which can be reversed by noradrenaline. G. Giglioli showed that the eradication of malaria from the coast of British Guiana has been followed by a great reduction in the mortality from nephritis.

E. Paulini (and later M. Pinotti) reported studies on table salt to which chloroquine had been added, and which is used in Brazil for the prophylaxis of malaria. The use of this preparation is controlled by simple chemical tests in house visits, for the determination of chloroquine in the urine.

H. M. Gilles has been able to show in Gambia that malaria plays a major part in the development of high levels of serum gamma globulin in infants, and that this may represent a specific immunological response.

In the section on the epidemiology of malaria and problems of control L. J. Bruce-Chwatt and H. M. Archibald described the project which has been in existence in a large area of Northern Nigeria and in which the residual insecticides have been used and compared. The outstanding fact seems to have been the appearance of strains of *Anopheles gambiae* resistant to dieldrin and BHC, but not to DDT. This resistance is being studied intensively at the Ross Institute in London, and the importance of resistance in this and other species of anophelines is enough to lead J. R. Busvine to the opinion that it threatens the success of future malaria eradication schemes. Resistance in 2 species has been found to depend on a single Mendelian factor, and the most hopeful method of preventing it may be by dual attack with insecticides of different types. But in the meantime A. Soeiro reports useful results from BHC in reducing malaria in Lourenço Marques, though R. H. Daggy records resistance to DDT in *A. stephensi* in Saudi Arabia, and consequent loss of efficiency which required a switch to dieldrin. On the other hand, A. M. Ciuca and his colleagues report that Rumanian species remain sensitive.

Technical problems related to insecticides were discussed by R. A. E. Galley and by F. P. Coyne; and F. W. Knipe [whose contributions to the technique of spraying date back to the time before the war when he and P. F. Russell pioneered pyrethrum spraying in India] commented on the importance of modernization of equipment.

Section 4 was entitled Malaria Eradication, and indeed, from the evidence presented by the numerous speakers from many parts of the world, no less than eradication is intended. But among the papers presented, only 3 related to Africa. M. Kivits explained the extent of the campaign in Ruanda-Urundi but without reference to resistance, and a team led by G. A. Livadas, after studying the situation in the southern French Cameroons, concluded that eradication is possible, and they report that so far no resistance has been observed. M. H. Holstein emphasized the importance of the study of *A. gambiae* and of the secondary vectors.

For the rest, important papers on eradication came from E. J. Pampana who surveyed the general problem, from F. L. Soper and C. A. Alvarado for the Americas, and from authors speaking for Greece, Venezuela, Mexico, Ceylon, Argentina, U.S.S.R., U.S.A., Brazil, Colombia, Goa, Thailand, Formosa and Portugal itself (where A. R. Martins described an epidemic in Lisbon in 1941). Some of these authors discussed notable results already achieved, as in Venezuela (A. Gabaldón), others described work in progress. But the general theme was optimism, though Gabaldón suggested that transmission by species which rest and bite out of doors may interfere, more than insecticide resistance, with eradication programmes. Chemoprophylaxis or treatment had a part in some of the programmes.

The Congresses afforded those all-important opportunities of meeting workers from all over the world—though we missed our Indian colleagues —and of expressing admiration for the work of such leaders as E. J. Pampana, N. H. Swellengrebel and (*in absentia*) Sir Leonard Rogers.

The organization of so great an event as these Congresses must have involved a formidable amount of work, and the participants were united in paying tribute to Professor J. Fraga de Azevedo, the President, and to Dr. M. R. da Cunha Pinto, the Secretary General, and to their devoted colleagues and their staffs, for the smoothness which pervaded the whole meeting.

It was not all work, and those who experienced the hospitality which our Portuguese hosts lavished on us in most delightful surroundings will remember their cordiality and charm with particular pleasure.

Charles Wilcocks

East Africa High Commission. **East African Medical Survey and Research Institute, Mwanza, Report 1956–57** [Holmes, E. G., Director]. 30 pp. 1958. Nairobi: Govt. Printer. [Sh. 2.]

This Institute is based on Mwanza, at the southern end of Lake Victoria, and is under the direction of Dr. E. G. Holmes. Its ambit includes research on human nutrition, parasitology and haematology, and it carries out *ad hoc* health surveys at the request of the East Africa High Commission.

Dr. E. G. Holmes's team reports the results of an investigation into the absorption of foodstuffs by Africans and Europeans from both African and European diets, on body composition and on the water content of cereal foods. The last investigation emphasizes the wide variation in water content of different preparations of the same cereal, which may influence the accuracy of calculations based on standard food tables, since these frequently underestimate this factor.

Dr. P. Jordan and his collaborators are carrying out experiments on the eradication of *Wuchereria bancrofti* filariasis by mass chemotherapy, and on the alleviation of filarial lymphoedema. In respect of the latter.

prednisolone has shown promise in early cases but the intra-arterial injection of hyaluronidase has been without effect. Observations on the uptake of *W. bancrofti* larvae by *Culex fatigans* and on their subsequent development within the mosquito have shown that diethylcarbamazine (Banocide) treatment does not impair the viability of the residual microfilariae in the host's circulation or prejudice their subsequent development into infective forms. An interesting finding has been that of the total number of larvae ingested, whether subjected to diethylcarbamazine or not, 93% fail to develop within the mosquito host: of this proportion the majority are ejected in the faeces of the insect.

Surveys have been carried out on the incidence of schistosomiasis in a number of localities. Work is also being carried out on the distribution of toxoplasmosis in the animal population.

Mr. W. F. J. McClelland, a biologist, reports on the systematics and distribution of snails of the genus *Biomphalaria*, the intermediate host of *S. mansoni* in Lake Victoria, and on the local representatives of the genus *Bulinus*, which is concerned in the transmission of *S. haematobium*.

Haematological investigations have been carried out by Dr. A. R. Moore into variation in the leucocyte count of Africans living at varying altitudes from sea-level to 7,000 feet.

Dr. G. A. Walton and his assistant have been working on the epidemiology of relapsing fever and have obtained evidence that 4 morphologically and biologically distinct strains of *Ornithodorus moubata* exist, namely A, which feeds on man, B, on domestic fowls, C, on warthog, and D, a new variant found on the Uluguru mountain which, though feeding on fowls, is morphologically distinct from B.

A survey of diseases endemic in the Rufiji Valley, lying at sea level in the Eastern Province of Tanganyika, has been carried out by Dr. A. R. Moore, and has been combined with a study of haemoglobin levels and of mean heights and weights.

[While the activities of this Research Institute are mainly directed towards local problems in an area characterized by heavy parasitization and considerable malnutrition, nevertheless, much of the information obtained is of general interest throughout the tropical belt.] *J. H. Walters*

Krampitz, H. E. Über das heutige Sizilien in hygienisch-zoologischer Sicht. [**Current Zoological Problems related to Health in Sicily**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 2, 111–28. [Numerous refs.]

This present assessment of hygienic and medical problems in Sicily is based on extended journeys through the island in 1953, 1955 and 1957. A few relevant characteristics of the island are noted, especially the high population density for a Mediterranean country and the deforestation and erosion, which, however, have been halted.

The first disease considered is malaria, which assumed serious proportions during and soon after the war. In 1941, one region showed 37·5% malaria rate (with 2·6% gametocyte carriers); in another region near Palermo, practically every tenth man was affected in 1946, but by 1952 this had fallen to 0·005%. In 1953, among 4½ million people, only 10 reported cases were noted and this disappearance of the disease has continued. The extinction of malaria has been due to house spraying with DDT, which has eliminated most of the vectors entering houses. However, these vectors (principally *Anopheles labranchiae* and *A. superpictus*) are able to exist all over the island and are not dependent on man. Therefore, there seems no possibility of exterminating them and control measures must be maintained. A review of the types of breeding sites available in summer months shows these to be so numerous as to defeat antilarval campaigns on an island-wide scale. Adult control, however, remains feasible since, up to 1957, no detectable change in susceptibility was found in tests on the 3 main vectors [see, for example, this *Bulletin*, 1957, v. 54, 122].

Leishmaniasis is another disease which became prevalent in Sicily at the end of the war. This was originally ascribed to large numbers of stray dogs at that time; however, tests on 82 dogs in 1948 revealed only 6 infections. In more recent years, the disease has practically vanished, owing to the great susceptibility of *Phlebotomus* to DDT. The bed bug *Cimex lectularius* has also been very greatly reduced by DDT spraying. In contrast, house-flies have become highly resistant and are now common. No serious reduction can be expected short of great increases in sanitation which would involve changes in habits of the population.

The author makes many observations on fleas. Though plague has not been seen in Sicily since 1920, fleas continue to transmit sporadic murine typhus (due to *Rickettsia mooseri*). Of the comparatively few small Sicilian mammals, only the rats (*Rattus norvegicus*, *R. r. rattus* and *R. r. frugivorus*) and mice (*Mus musculus brevirostris*) are commensals. They may, however, acquire fleas from the wood mouse (*Opodemus sylvaticus dichrurus*). The habits of these rodents are discussed. The house rats are indigenous and are not so strictly confined to dependence on man as the brown rat (*R. norvegicus*), which is a more recent introduction and is most common in harbour towns. Here it feeds on excrement and waste in sewage outflows, rubbish dumps, etc. The house rats, especially *R. r. frugivorus*, feed on fruit and grain as well as human foods.

Trap experiments have given a rough picture of the flea populations of these various rodents in different parts of the island. In the lowlands, especially near the coast, all species were common and several kinds of flea (especially *Echidnophaga murina*). The plague flea, *Xenopsylla cheopis*, was only found here and only on the brown rat. Further from the coast, and higher up, the common commensal rodents and their fleas became less common, leaving the wood mouse carrying various fleas.

Apart from the temperature difference, the author thinks that the drier nature of rodent burrows in the mountains were less favourable for the common rodent fleas, which thrive in damp burrows in the plains.

Of the ticks and parasitic mites, the author mentions *Rhipicephalus sanguineus* (carrier of tick fever in animals) and *Ixodes* spp. Also the rat mite, *Bdellonyssus bacoti*, and harvest mites, *Trombicula* spp.

Intestinal parasites are not uncommon, especially *Entamoeba coli*, *E. histolytica*, *Iodamoeba bütschlii*, *Giardia intestinalis*, *Hymenolepis nana*, *Ascaris lumbricoides*, *Enterobius vermicularis* and *Trichuris trichiura*. These are spread by habits of the people, especially the use of sewage on garden plots.

Some of the hygienic problems are caused by the people living in crowded communities, rather than in isolated farms; this habit being due to the former prevalence of bandits and malaria. *J. R. Busvine*

BOWER, B. D. **Child Health and Disease in Jamaica. Some Impressions.** *Lancet.* 1958, June 28, 1379–82. [14 refs.]

The article is a good summary of the main factors affecting child health in Jamaica and is based on the author's experience as a visiting lecturer in paediatrics for 6 months. Readers of this *Bulletin* will be familiar with many of the problems mentioned, which include observations on malnutrition, diphtheria, tetanus and a number of other conditions. The author concludes with a paragraph on "Preventive Paediatrics" which gives an insufficient account of existing services. He is correct in pointing out the great need for the extension of services for children—both curative and preventive. Irresponsible parents are one of the gloomiest features of the West Indian scene. *Cicely D. Williams*

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